
U. R. S. I.

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XVIII URSI GENERAL ASSEMBLY

Lima, Peru, August 1975

As already announced, the XVIII General Assembly of URSI will be held in Lima at the invitation of Dr. A. A. Giesecke and the URSI Committee in Peru. The Opening and Closing Plenary Meetings will take place on Monday 11 and Tuesday 19 August 1975. Between these dates as much time as possible will be allocated to the scientific sessions organised by the Commissions.

As in Warsaw, the dates for the meetings of the URSI Council have been arranged so as to leave members of the Council and of the Board of Officers free to participate in almost all the scientific sessions. The provisional time-table is shown below.

It is proposed also to arrange three symposia just before or during the Assembly :

Symposium A : Remote sensing of the Earth's surface by radio waves and its applications to the needs of developing countries.

Symposium B : The use of satellites for educational broadcasting.

Symposium C : Applications of radio methods in the biological sciences.

The First Announcement concerning the Assembly and local arrangements in Lima will be sent to all Member Committees in May 1974.

PROVISIONAL TIMETABLE

August 1975.

Friday 8	Board of Officers (morning) URSI Council (afternoon)
Saturday 9	URSI Council (all day)
Sunday 10	Chairmen of Commissions (morning) Registration for Assembly (all day)
Monday 11	Registration for Assembly (all day) Opening Plenary Meeting (morning) Commissions : business meetings (afternoon)

Tuesday 12	Commissions and Working Groups (all day)
Wednesday 13	Commissions and Working Groups (all day)
Thursday 14	Commissions and Working Groups (all day)
Friday 15	Commissions and Working Groups (all day) URSI Council (afternoon)
Saturday 16	Free
Sunday 17	Free
Monday 18	Commissions and Working Groups (all day)
Tuesday 19	Commissions and Working Groups (morning) Closing Plenary Meeting (afternoon)
Wednesday 20	Board of Officers (new) (morning)

INTERNAL REORGANISATION OF URSI

As recommended by the URSI Council last year, the Board of Officers has begun its discussions on the internal reorganisation of URSI. In order to enable the Chairmen of Commissions, or their representatives, to express their views, the Board authorised the formation of two groups representing :

- A. Commissions III, IV and VIII (*Chairman*, Prof. Booker).
- B. Commissions I, II, V, VI and VII (*Chairman*, Prof. Migulin).

Group B met in Brussels on 27-28 September and, in the absence of Prof. Migulin, the President took the Chair. After the meeting a statement was prepared for submission to the Board of Officers; this is reproduced below.

Mr. Lundbom and Mr. Eklund prepared documents for this meeting in which they expressed their views on various aspects of the activities of Commissions I and II; their contents are summarised below. It should be pointed out that these documents were intended as contributions to the discussions at the meeting in Brussels and they do not necessarily represent the final conclusions of the authors.

The members of Group A have exchanged their opinions by correspondence and it is intended to convene a meeting in the fairly near future. A report on this meeting and on the meeting of the Board of Officers on 28-29 March 1974 will appear in the March issue of the Bulletin publication of which will be delayed until mid-April.

Statement by Representatives of URSI Commissions I, II, V, VI and VII

September 1973

1. The representatives of URSI Commissions I, II, V, VI and VII met in Brussels on 27 and 28 September 1973 in order to exchange their views on the international reorganisation of URSI, which had been recommended by the XVII General Assembly of the Union in 1972. The principal conclusions reached during the discussions are summarised in the present statement which is to be transmitted to the Board of Officers of URSI.

2. The group reviewed the historical development of URSI, and of its parent International Commission, during the period 1913-1973. It was noted that the central theme of the activities of the Union had always been the scientific aspects of radio communications, including the applications, in other branches of science, of remote sensing by radio methods. However, with the introduction of allied topics such as information theory, transmission in optical fibres, electron devices, etc., URSI had, for good reasons, extended its interests beyond radio communications to certain aspects of the broader subject of communications science.

3. It was agreed

3.1. that the basic objective of URSI should continue to be the stimulation of research in the field of communications and information science, including the applications of radio methods in astronomy, geophysics and other branches of science;

3.2. that the scientific programme of URSI should be reorientated so as to enhance the effort devoted to communications and information science;

3.3. that the necessary modifications in the scientific programmes of the Commissions, and the eventual creation of new Commissions, should result from a gradual, but rapid and controlled, evolution and not from a sudden drastic change;

3.4. that the principles of the Booker-Voge suggestions provide an acceptable basis for a reorientation of the scientific activities of URSI, but that it is premature to consider the need for a change in the title of the Union;

3.5. that there is a continuing need for a group of Commissions dealing with remote sensing and with the interaction of radio waves with various astronomical, biological and geophysical media, and that it does not appear to be desirable at present to cover all these activities within a single Commission on remote sensing.

4. It was noted that most of the topics suggested by Prof. Booker, as being appropriate to a Union concerned with communications and information science, could be accommodated within the existing Commissions, pending the evolution of new Commissions when the need for these became apparent.

5. Several recommendations were made with particular reference to the General Assembly in 1975.

5.1. The scientific sessions should place the emphasis on communications and information science.

5.2. Since the field to be covered by Commission VI is already very wide and seems likely to expand, the Commission should consider the need for changes in its structure.

5.3. It is intended to organise three Symposia before or during the Assembly on :

(a) Remote sensing of the Earth's surface and its application to the needs of the developing countries;

(b) Applications of radio methods in the biological sciences;

(c) The use of satellites for educational broadcasts.

6. It was agreed that, when it appeared to be consistent with the main objective of URSI, it would be desirable to add new topics to the scientific programme of the Union.

At the present time it would be appropriate :

6.1. to introduce matters relating to acoustic communication systems and to enquire from IUPAP whether there was a need for an inter-Union forum to deal with this subject;

6.2. to consider giving increased attention to the applications of radio methods in biological science (see 5.3);

6.3. to encourage Commission VII in developing further its interest in new electronic devices even when these are not necessarily directly applicable to the work of the other Commissions of URSI but have other applications, for example in communications science;

6.4. to make greater efforts to develop cooperation between Commissions (including the creation of inter-Commission working groups) especially between those Commissions which are concerned with the basic science and those which are interested in its applications in other branches of science;

6.5. to ask the Secretary General to notify the Chairmen of Commissions as soon as possible of the time and the space that will be available in Lima for the scientific sessions;

6.6. to consider the possibility of opening the scientific sessions of the Assembly to participants who are not members of national delegations.

7. The group gave some consideration to the introduction of individuals as members of URSI, in addition to the present Member Committees. It was recommended that no action be taken to introduce individual membership since the advantages which would follow appear to be outweighed by the disadvantages.

8. It was recognised that URSI and other Unions had a common interest in certain branches of science and that, in such cases, it was necessary to encourage joint action and to avoid duplication of effort. It was agreed that inter-Union Working Groups appeared to provide a satisfactory means of achieving these objectives.

9. It was noted that the Communications Society of the IEEE had made certain suggestions concerning future relations between URSI and the Society. It is recommended that the Board of Officers should give serious attention to these suggestions and that, at the same time, URSI should consider making contacts with other national organisations such as the Popov Society, the Société des Radioélectriciens, etc., which are also interested in communications and information science. It was recommended also that Member Committees should be encouraged to establish closer relations with the appropriate national professional societies.

Present and Future Activities of Commission I

P. O. LUNDBOM, *Chairman Commission I*

Note. — At the request of Mr. Lundbom, the following article has been prepared by the Secretary General. It is a condensed version of a much longer document prepared by Mr. Lundbom as a contribution to the discussions at the meeting of representatives of Commissions I, II, V, VI and VII on 27-28 September 1973.

1. — GENERAL.

There may exist reasons for increasing the number of Commissions as well as, in some cases, changing and limiting the scope of their activities. However, both new and old Commissions should not be static, but should show dynamic flexibility and adjust themselves continuously to new demands

and possibilities. More joint sessions at Assemblies and coordinated activities between Assemblies seem to be very desirable.

Booker-Voge and others say that URSI should concentrate on radio and telecommunications science; I agree with enthusiasm. I shall not comment at present on the question of a radical change in the Commissions and in their particular objectives. In my opinion, however, there are many positive advantages in the Booker-Voge plans. After some hesitation I agree that electro-acoustics and optoelectronics should be included in URSI's programme.

It seems important for URSI as a whole to establish and maintain sound relations with other international scientific and engineering organisations and to collaborate with them. This is of particular importance for Commission I.

2. — ACTIVITIES OF COMMISSION I.

2.1. — Commission I is making constant efforts to improve, refine and expand the science of measurement, as well as instrumental techniques, by taking advantage of the latest advances in radio science and in other branches of science. The Commission also contributes to the provision of measuring instruments and methods required by the other Commissions of URSI.

2.2. — A list of possible future developments and new topics relevant to Commission I is given in Appendix 1.

2.3. — Organisations outside URSI frequently arrange meetings, symposia and conferences in the field of Commission I. In consequence the Commission itself seldom needs to organise such events between URSI Assemblies.

2.4. — It seems to me that "electromagnetic theory" should be explicitly recognised as part of the terms of reference of one Commission. In principle the subject has close links with measurements, but it is often important in the other URSI Commissions and it would probably be difficult to distinguish between basic and applied electromagnetic theory.

2.5. — Commission I has quite successfully adjusted itself to current demands and it now spans a very broad range of subjects. It is significant that, at the URSI Assembly in 1975, the following subjects, among others, will be discussed :

- (1) automated and computerized measurements;
- (2) the Josephson junction as a circuit in electronic measurement systems;

(3) measurement of electromagnetic pollution (a field in which Commission I could play an important coordinating and interdisciplinary rôle).

2.6. — It is often difficult to distinguish between radio science and electronics, especially when dealing with measurements. URSI should maintain its interest in radio measurements but increased attention should be given to electronic measurements such as digital measurements; the transmission, presentation and processing of data; telemetry and parts of “remote sensing”.

2.7. — It seems desirable to develop closer links with leading research workers who are active in developing and designing measuring instruments in the laboratories of instrument manufacturers.

2.8. — Dr. Altschuler (Vice-Chairman, Commission I) has made most valuable contributions to the discussion on the internal reorganisation of URSI and a summary of the main points raised in his letters is given in Appendix 2.

APPENDIX I

Future developments and new topics relevant to Commission I

1. Definition of the units of length and time on the basis of the same atomic or molecular transition; the possible assignment of a fixed value, having no uncertainty, to the velocity of light.

2. Definition of the volt in terms of the Josephson effect.

3. Determination of temperature in the mK range by measurement of frequency fluctuations in the signal emitted from a Josephson junction exposed to thermal noise.

4. Investigation of the hydrogen maser as a possible replacement of the Cs-beam resonator as a primary frequency standard. The possible use of the stabilised He-Ne laser as a single standard for length and time interval.

5. The possibility of a single standard for frequency, time interval, length, voltage and temperature and of world-wide intercomparisons based on radio transmissions of standard time and frequency.

6. DC, LF and HF measurements.

(a) It will be necessary to have an international accepted value of e/h for use in defining the international standard of voltage in terms of the Josephson effect.

(b) Further refinements and extensions of the technique, using the Josephson effect, for the conversion of minute variations in magnetic flux or voltage into measurable variations in rf impedance.

(c) For measurements of ac voltage in the lower part of the em frequency spectrum, a further refinement of the multiplication thermal converter, with suitable frequency compensated series resistors, seems to be one way of increasing the accuracy in the ac-dc transfer technique.

(d) With further modifications and refinements, it should be possible to reduce the uncertainty of hf voltage measurements, using the Bolovac, to better than 1 % at the upper frequency limit of the instrument.

7. Extensions in the use of swept-frequency techniques for making measurements at microwave frequencies. Increased accuracy and decreased cost of computer-aided microwave measurement systems. Increased activity in measurements and standards in the millimetre wave band.

8. The numerous sources of error seem to limit the accuracy of absolute noise standards to 0.05-0.1 dB; about half of the error is due to residual VSWR. Further improvements seem to involve very high costs and investments depend mainly on the requirements of lower-level routine measurements.

9. Automated and computerized measurements.

(a) Digitisation is necessary for automatic measurements; the result of every measurement is obtained by reference to a standard quantity.

(b) Control of automated measurements by a programme giving considerable flexibility.

(c) Technological progress towards inexpensive and compact units will continually create new demands for automated (computer-controlled) measurement techniques.

10. Measurements relating to electromagnetic pollution will become more and more important.

11. In addition to the quantities that can be measured at present, there will be new demands for international comparisons of peak power, phase, group delay, reflection coefficient, etc.

12. The following new topics will probably become important in Commission I :

(a) measurement of extremely small values of power, voltage, current, attenuation, etc.;

- (b) measurements and standards in ultrasonic and microwave acoustics;
- (c) applications of sophisticated measurements to the solution of world social problems.

APPENDIX 2

Summary of views expressed by Dr. H. M. ALTSCHULER

Future Scientific Problems

Scientists and their organisations share a responsibility for facing up to the increasing number of world social problems and helping to solve them. URSI should broaden its philosophical objectives by declaring its interests in those scientific and engineering fields which could contribute to such solutions.

A few of these problems are as follows :

1. Pollution of the em spectrum and the em medium and the effects of radiation on man, animals and plants.

2. Social problems to which radio methods could be applied :

- (a) public health, diagnostic and therapeutic medicine;
- (b) monitoring and control of air and water pollution;
- (c) mapping the environment (weather, state of the sea, Earth's mineral resources, surveys of crops and forests);
- (d) transmission, at higher frequencies, of energy derived from the Sun, conservation of electrical energy at (or by the use of) higher frequencies, hydrothermodynamic approaches;
- (e) air and land traffic control, avoidance of collisions.

Many of the above problems have received some attention in URSI, but few of them have been given the explicit emphasis they deserve.

Reorganisation of URSI

The excellent scientific subject divisions in radio science generated by M. Voge and Prof. Booker may encourage the view that there should be a rather large number of small Commissions. The total number, however, should be kept small for economic and administrative reasons and also because :

- (1) the coordination of programmes would be difficult if there were too many Commissions;

(2) small-size Commissions would be less stable because of variations in the level of interest in their specialised fields;

(3) the interaction of different ideas takes place more easily in larger Commissions with broad fields of interest;

(4) in a large Commission, working groups can be formed to deal with special topics or temporary problems.

Radiobiology

URSI should include radiobiology in its programme, but there should not be a separate Commission for this subject. Many experimenters in radiobiology have biological or medical backgrounds; they need the strong support of radio people and they should be immersed in the Commissions rather than isolated in a separate Commission.

It would probably be preferable for one Commission to focus strongly on biological effects of em radiation and related matters. Commission I has already been active in this field, has contacts with bio-medical people and seems to provide a logical forum for radiobiology. When appropriate, joint activities with other interested Commissions could be organised.

Individual Membership

The proposal to have individual members in URSI has substantial merit provided that provision is made for an equitable distribution of individual members among the Member Committees of the Union.

It would still be desirable to retain the Official Members in each Commission since they serve as very useful points of contact in various aspects of URSI business. Member Committees, as well as the Chairmen and Vice-Chairmen of Commissions, should be able to propose individual members of Commissions. Not more than a small proportion of the members should come from any one country.

Scientific Activities of URSI Commission II after 1975 with Special Reference to Telecommunications

F. EKLUND, *Vice-Chairman URSI Commission II*

1. — DRIVING FORCES FOR RESEARCH IN THE FIELD OF TELECOMMUNICATIONS.

1.1. — First it should be noted that there is a trend in many countries to allocate relatively more research funds to applied research, directed towards the solution of current problems in society, and less to free academic research. Perhaps URSI should consider this trend and discuss how it affects the future scientific activities of the Union. Telecommunications is one of these areas of applied research which has been given high priority in many societies (cf. The formation of OT/OTP in the USA, the "Cost"-programme in Europe, etc.).

1.2. — There are some trends in the development of needs and techniques for telecommunication systems which seem to be particularly important in relation to the future of the activities of URSI Commission II. They are listed below, but not in order of importance :

- (a) Increasing need for air-to-ground and ground-to-ground mobile telecommunication systems.
- (b) Increasing need for national and international satellite telecommunication systems for both fixed (including broadcasting) and mobile services.
- (c) Increasing demand for broad-band radio links.
- (d) Increasing need for high-precision air traffic control and guidance around airports and along main air routes.
- (e) Increased use of PCM-systems.
- (f) Increased use of adaptive systems or system parts.

This list is not complete but it may serve as a background for some statements concerning what might be expected from telecommunications research in the near future.

2. — SOME CONSEQUENCES FOR FUTURE RESEARCH IN THE FIELD OF URSI COMMISSION II.

2.1. — The trends in the needs mentioned above and the development of technical resources will create questions for which we should try to have answers ready when these questions arise; a well-balanced, forward-looking and problem-oriented research programme will be required if we are to

provide answers. In the following, I shall try to describe what I feel are some of the main problem areas in telecommunications research, with special reference to tropospheric radio-wave propagation.

2.2. — It is inevitable that all parts of the frequency spectrum will become more and more crowded. As our frequency space is limited, we must try to use each part of it in an optimum way. So, when a new telecommunication need arises, it will be necessary to try to find a frequency which is particularly suited for it; we shall also have to ask whether the need is important enough, from the social and economic points of view, to justify the occupation of a part of the costly frequency spectrum.

Research aimed at describing the possibilities and the limitations, for telecommunications, of frequencies above 10 GHz (including optical frequencies) will continue to have a high priority as it will increase the available spectrum range.

2.3. — It is also inevitable that interference problems will become more and more serious. In order to handle them we must learn more about the propagation conditions that give rise to high fields beyond the normal radio horizons of transmitters, and develop models describing where and when these high fields will occur.

2.4. — It seems to me that high priority must be given also to studies of propagation problems likely to be encountered in the development of new mobile telecommunications systems of all kinds. Here we need to know more about field variations in time and space, multipath effects, depolarization phenomena, and many other problems.

2.5. — Satellite telecommunication problems are well recognized both nationally and internationally. Of special importance is a study of the problems involved in frequency sharing between satellite and ground-based systems, especially in the microwave region, and a study of the possibilities for using millimetre and shorter wavelengths.

2.6. — The demands for extremely broad-band systems or for high precision in navigation and traffic control can, as a rule, be met by sophisticated design of equipment. More and more often the ultimate limits for system precision and capacity are set not by the equipment itself, but by electromagnetic wave propagation phenomena.

So we must learn about these phenomena and describe them in such a way that the total system design can be optimized. This means also that it is important that radio-wave propagation studies should form an integrated part of telecommunication system studies. It is of special

importance in this context to learn more about fading, time-delay spread and Doppler spread with special reference to PCM-systems for all types of ground-to-ground fixed paths.

2.7. — For many applications it is also of importance to know about the spatial field characteristics.

2.8. — For all the types of telecommunication system considered here, propagation conditions change from time to time and even from moment to moment. The classical way of solving the problems that follow from this situation is to design telecommunication systems with such margins that they can operate during nearly all conditions. The increasing density of such systems, however, tends to make this approach impracticable. The possible use of adaptive systems suggests that the system instead should be made flexible so that it can work in an optimum way with regard to the existing propagation conditions.

An important problem is to find out and to describe what the relevant propagation conditions are, especially the short-term characteristics to which the system must adapt. This implies an increasing need for the development of combined detailed deterministic and statistical propagation models. As the type of model needed may vary between systems, it is important that the work on models be performed in close contact with system studies.

COMMISSION VI CIRCULAR MEMORANDUM FROM THE CHAIRMAN

To Presidents of Members Committees of URSI

At the 1975 General Assembly in Peru, I plan to have a discussion on the possible splitting up of Commission VI into several Commissions. Among other recommendations, I will recommend that Information Theory be a separate Commission.

I would hope, at the end of the second Business Meeting of Commission VI, that VI will vote on splitting itself up into more than one Commission and that it will be in the form of a recommendation ⁽¹⁾ to the Board

⁽¹⁾ *Note from Secretary General.* — Such a recommendation will be submitted to the URSI Council which makes decisions concerning the creation and abolition of Commissions in accordance with Art. 62(c) of the URSI Statutes.

of Officers, hopefully for them to act on at their last Business Meeting in Lima.

Depending on the results in forming a new Commission, I would hope that at the following General Assembly, there would be a further splitting.

All advice concerning the splitting up of Commission VI would be appreciated.

19 October 1973

Keeve M. Siegel,
KMS Industries Inc.,
3941 Research Park Drive,
Ann Arbor, Michigan 48106,
USA.

VIII NATIONAL CONVENTION ON RADIO SCIENCE

Helsinki, October 1973

The Finnish National Committee of URSI held its eighth traditional Convention on Radio Science on 16-17 October 1973. The Convention was held in the rooms of the Electrical Engineering Department of the Helsinki University of Technology. The first National Convention was held in 1953 following the establishment of the Finnish National Committee in 1952. Since 1953, Conventions have taken place every third year almost without exception.

Altogether, 80 reports were given in two parallel series. The papers were distributed in the following sessions :

Electromagnetic waves and propagation	17 reports
Microwave technology and circuit design	15 reports
Measurements and instrumentation	14 reports
Information processing and computers	14 reports
Antennas	8 reports
Solid-state technology	7 reports
Bioelectronics	5 reports

The Convention opened with an address of welcome by Prof. M. Tiuri, President of the National Committee of URSI. An invited opening address, entitled "On the activities of URSI Commission I during the last 20 years and plans for the future", was given by Mr. P. O. Lundbom (Research Institute of National Defence, Sweden) who is Chairman of URSI Commission I.

In addition, four invited papers were given :

“Atmospheric and solar millimetre phenomena” by Dr. D. L. Croom
(Radio and Space Research Station, United Kingdom);

“Current research in microwave technology and new applications of micro-
waves” by Prof. M. Tiuri (Helsinki University of Technology);

“Information processing and computers : state-of-the-art” by Prof. T.
Kohonen (Helsinki University of Technology);

“Technology of solid-state components” by Dr. T. Suntola (Technical
Research Centre of Finland).

The number of participants at the Convention was about 300. A few
copies of the abstract leaflet in English have been mailed to the Secretaries
of URSI National Committees.

COLLOQUE DE L'IUCRM

22-31 octobre 1973

Ainsi qu'on l'avait annoncé dans le *Bulletin de l'URSI*, No. 187, la
Commission inter-Unions de Radiométéorologie a organisé à Nice (France)
un colloque dont le titre était “ Structure fine des précipitations et propa-
gation des ondes électromagnétiques ”. Ce colloque était ouvert à tous les
auteurs de contributions. Il a réuni 76 participants provenant de 14 nations
différentes, et on doit en noter une très bonne répartition géographique
puisque la nation la mieux représentée n'avait pas le quart des délégués.

Les activités ont été partagées en trois parties sensiblement égales entre
elles ainsi qu'il est de tradition à l'IUCRM :

7 exposés de synthèse,

43 communications individuelles,

4 groupes de travail (subdivisés rapidement en plusieurs sous-groupes).

Ces trois parties correspondent à trois stades du développement de la
recherche : *a)* ce qui est acquis au début du colloque, *b)* les travaux reçus
ou en cours, *c)* la synthèse de ces travaux et les grandes lignes qui en
découlent.

On a eu l'avantage de réunir les meilleurs spécialistes des sujets traités
ce qui donne tout son intérêt aux travaux de synthèse.

Une grande partie des exposés, des contributions et des rapports des groupes de travail sera publiée dans le courant de 1974 dans un numéro spécial du *Journal de recherche atmosphérique*.

K. Hardy et I. Revah.

Notes :

1. Par suite de la date de parution de ce Bulletin, le compte rendu complet n'a pas pu être établi; il paraîtra dans le prochain numéro du Bulletin.
2. Il reste quelques recueils des contributions présentées à ce colloque; il s'agit de deux tomes d'environ 200 pages chacun, qui peuvent être achetés ensemble au prix de 50 FF (versé à la commande par chèque au nom de « I. Revah IUCRM » à l'adresse suivante :

I. Revah
CNET
3 avenue de la République
F - 92131 Issy-les-Moulineaux, France.

Notes :

1. A fuller account of the Colloquium will appear in the next issue of the Bulletin.
2. The advance copies of the papers presented were available in two volumes each of about 200 pages. A few copies of these still remain and may be purchased for 50 French francs from

I. Revah
CNET
3 avenue de la République
F-92131 Issy-les-Moulineaux, France.

An order must be accompanied by a cheque payable to *I. Revah IUCRM*.

BIOLOGICAL EFFECTS AND THE HEALTH HAZARD OF MICROWAVE RADIATION

A Symposium on the above subject was held in Warsaw in September 1973 with the cooperation of URSI. It was attended by 64 participants from 14 countries and 40 papers were presented. The objective was to facilitate the exchange and evaluation of information about the dangers of microwave radiation, and to focus attention on those areas in which there is a need for additional information or for the development of new approaches.

It was recognised that it would be desirable to stimulate further international cooperation on the exchange of information, by various means, and to establish internationally recognised definitions and nomenclature applicable to the measurement techniques involved.

The World Health Organisation (WHO) already coordinates work on ionizing radiation through the International Committee on Radiation

Protection (ICRP) and the International Commission on Radiological Units (ICRU). It is not yet clear whether these bodies could deal also with non-ionizing radiation, or whether it would be preferable to set up a separate body having necessary specialist knowledge of em radiation and related matters. It seems probable that URSI Commission I could give valuable assistance to the body which will ultimately be responsible for this work.

In the discussions at the Symposium, a distinction was made between :

- (a) high intensity radiation capable of causing thermal effects (10-100 mW/cm²),
- (b) intermediate intensities causing weak thermal effects and some direct effects (1-20 mW/cm²),
- (c) low intensities which are unlikely to cause thermal effects (less than 1 mW/cm²).

Within each intensity level there is a need for a better understanding of many questions such as cumulative and delayed effects, sensitivity as a function of the kind of system and its stage of development, effects related to cellular transformations, etc.

It is understood that the organisers intend later to publish the main conclusions of the Symposium. The information given above was kindly provided by Dr. Peter Weissglas of the Microwave Institute Foundation in Stockholm.

SYMPOSIUM ON SOLAR-TERRESTRIAL PHYSICS

São Paulo, 17-22 June 1974

The programme of the above Symposium was published in *URSI Information Bulletin*, No. 188.

The Secretary of the Programme Committee has recently circulated a Preliminary Attendance Survey Form and Call for Papers. Intending contributors are invited to send abstracts (not exceeding 200 words) to the Chairman :

Prof. S. A. Bowhill,
Department of Electrical Engineering,
University of Illinois,
Urbana, Illinois 61801, USA,

so as to reach him not later than 15 February 1974. Abstracts should, if possible, give preliminary results and conclusions.

Speakers will have 10-15 minutes in which to present their papers which should emphasise the analysis and physical interpretation of experiments and should not be mere summaries of observational data. Theoretical papers will also be welcome.

Only about 100 contributed papers can be accepted. Those which are considered unsuitable for the Symposium will be passed on to COSPAR for possible inclusion in the programme of the COSPAR meeting which will begin on 24 June. In such cases authors should also send copies of their abstracts to COSPAR through the normal national channels. Papers dealing with ATM, AE-C, ESRO-4 and the Jupiter probe can not be accepted for the Symposium and must be submitted to COSPAR.

The Brazilian Organising Committee will reproduce the full text of the papers promptly after the Symposium. The four volumes will be available at a nominal price payable during registration. Authors are requested to bring two clear and reproducible copies of their papers to São Paulo for the printers but this will not preclude subsequent publication in recognised scientific journals.

The 30 invited review papers will be submitted for publication in special issues of *Space Science Reviews* and *Journal of Atmospheric and Terrestrial Physics*.

Detailed information on pre-registration and participation in both the Symposium and the COSPAR Meeting will be given in COSPAR Circulars which will be distributed in December 1973.

The Secretary of the Programme Committee for the Symposium is

Dr. E. J. Dyer, Jr.,
National Academy of Sciences,
2101 Constitution Avenue,
Washington, D.C. 20418, USA.

SCATTERING AND EMISSION OF RADIATION FROM THE EARTH

Berne, 9-12 September 1974

Commission II is planning a specialist meeting on the scattering and emission of radiation from the surface of and from within the Earth. The meeting is intended to be of particular interest to those engaged in theoretical or experimental work on radar scatter and passive microwave emission from the sea. An active interchange of ideas between the participants is

expected since most of them will be actively working in this relatively confined field. The topics to be considered include random and air-water interfaces, soil, vegetation, snow and ice, buildings, roads and other man-made objects on the surface. It is not intended to deal with scatter from aircraft, rockets, etc. or from precipitation since these topics are more appropriate to a separate meeting.

The languages used will be English and French. The proceedings will not be published. A deadline for the submission of abstracts will be announced soon.

Further information is obtainable from the Chairman or Secretary of the Organizing Committee

Prof. R. K. Moore,
or Prof. A. W. Biggs,
University of Kansas,
2291 Irving Hill Road,
Campus West,
Lawrence, KS 66044, USA,

or from the Chairman of the Swiss Organizing Committee

Prof. E. Schanda,
Institute of Applied Physics,
University of Berne,
Sidlerstrasse 5,
CH-3012 Berne, Switzerland.

BEACON SATELLITES

Moscow, 1974

COSPAR, with URSI as cosponsor, will organise a Symposium on Beacon Satellite Investigations of Ionospheric Structure, and ATS-F Data. The Symposium will be held from 30 September to 4 October 1974 in Moscow with the approval of the Academy of Sciences of the USSR. Local arrangements are being made by Prof. Al'pert and Dr. Sinel'nekov.

Intending participants are invited to make contact with the Chairman of the Programme Committee :

Dr. R. Leitinger,
Institut für Meteorologie und Geophysik
der Universität Graz,
Halbärthgasse 1,
A-8010 Graz, Austria.

It is intended that the emphasis shall be on discussions rather than on the formal presentation of papers.

INTERNATIONAL SYMPOSIUM ON ELECTROMAGNETIC COMPATIBILITY (EMC)

An International EMC Symposium and technical exhibition is scheduled for 20-22 May, 1975 in Montreux (Switzerland) under the patronage of the Swiss Federal Telecommunications Authority. Cosponsors are the URSI, the IEEE Professional Group on EMC and the Society of Automotive Engineers (SAE) Committee AE-4 on EMC. Cosponsorship of further organisations is expected.

The Symposium will cover the whole field of the interaction between man-produced electromagnetic energy and electronic and biological systems, with special emphasis on the following topics :

- Social and economical impact of EMC, international cooperation, standards and specifications;
- Spectrum management, electromagnetic pollution control;
- Compatibility of electric power, automation and communications;
- Noise immunity of electronic systems : analog and digital;
- Biomedical effects of radio-frequency energy, EMC in medical electronics, radio-frequency safety hazards;
- Measuring methods, instrumentation, testing and analysis;
- Interference control in design and production.

An International EMC Exhibition will review the progress in suppression technology, design of compatible equipment, measuring techniques and advanced facilities for communications planning and interference control.

Intending participants who wish to present papers should submit summaries, up to 300 words, which should be received not later than 31 July, 1974 by Prof. F. L. Stumpers, Philips Research Laboratories, Eindhoven, Netherlands. The full text of the papers will be printed and made available to all participants.

For further information, apply to Dr. T. Dvorak, ETH-HF, Sternwartstrasse 7, CH - 8006 Zurich, Switzerland. Phone : Zurich 32.62.11, Ext. 2790.

GENERAL COMMITTEE OF ICSU

The General Committee of ICSU met in Leningrad in September 1973. The following Resolutions adopted by the Committee are of some interest to URSI.

The General Committee of ICSU :

1. — COOPERATION IN STUDIES OF PLANETARY SYSTEMS

wishing to avoid unnecessary overlap between the scientific activities of its member organisations;

stressing the importance of close cooperation and coordination in fields where overlap might occur;

invites the organisations actively interested in problems of planetary systems to investigate, in mutual cooperation, how such overlap could be reduced; and

requests these organisations to report on this matter to the 15 General Assembly of ICSU.

2. — IMPORTANCE OF FUNDAMENTAL RESEARCH.

being aware of the importance of fundamental research for the solution of environmental problems;

being further aware of the importance of such research for the cultural and economic progress of developing countries;

asks the ICSU scientific organisations to make due mention of (i) fundamental research as a general basis for future applications of science in their reports to ICSU as well as (ii) their contribution to the furtherance of scientific research in developing countries.

3. — REGISTRATION FEES FOR MEETINGS, SYMPOSIA, CONGRESSES

recommends that for international symposia, congresses and other meetings sponsored by members of the ICSU family the registration fee, that is the right to attend the meeting, should not exceed US\$ 30;

recommends further that under no circumstances should it exceed US\$ 50.

4. — COORDINATION OF SCIENTIFIC MEETINGS

wishing to avoid, when possible, unnecessary duplication in scientific meetings organised by the scientific organisations in ICSU;

requests that all members of the ICSU family send information on symposia and colloquia under consideration to the ICSU Secretariat; and

asks the ICSU Secretariat to distribute such information among members of the ICSU family as early as possible.

5. — REPORTS OF ICSU'S ADHERING SCIENTIFIC ORGANISATIONS

noting that the actual Reports of the scientific bodies often pay too little attention to scientific research as compared to administrative matters;

wishing to be informed in sufficient detail about the large scientific projects being undertaken by the scientific organisations in ICSU;

urges these organisations to report adequately on such projects in their Reports to ICSU, in particular drawing attention of the scientific significance and scope of the projects, their estimated time-scale, development and expected termination date, and other information such as the degree of international and interdisciplinary involvement.

6. — NEWSLETTERS

noting the need to inform individual scientists about the activities of ICSU;

recommends that the Newsletters and similar publications of the members of the ICSU family should in the future publish items of news concerning activities of other members which might be of interest to the readers;

requests the Unions, Committees, Commissions and Permanent Services to transmit items of information several times a year to the Editors of the Newsletters of other bodies whose members might be interested. Such items should include an address from which additional information can be obtained. The ICSU Secretariat is available to act as a clearing house for these items of information if required.

7. — PUBLIC RELATIONS

In view of the fact that both the scientific and non-scientific sectors of the community are inadequately informed about the work of ICSU;

requests

(i) the Executive Board to prepare a public relations programme to inform the world scientific community and the general public of the nature and value of ICSU's work, and

(ii) the Scientific Unions to inform, through their national adhering organisations and through other appropriate channels, the scientific and general academic communities, industry and, if possible, relevant government departments of the nature and value of their work;

invites National Members of ICSU to cooperate.

8. — RELATIONS WITH OTHER ORGANISATIONS

In view of the progressive increase in the interdisciplinary character of scientific research and the proliferation, outside the ICSU family, of international organisations concerned with specific scientific topics,

recommends that :

(i) the Secretary General invite the Scientific Unions to examine their programmes with the object of exposing those of possible interdisciplinary character and to take the initiative in establishing appropriate inter-union liaison at the working level;

(ii) in each Union, formal liaison should be actively promoted, by association or affiliation, with non-ICSU bodies whose interests are closely related to its own so that conflicts of interest can be avoided, and that the ICSU Secretariat be kept informed of these actions.

INTERNATIONAL ASSOCIATION OF GEOMAGNETISM AND AERONOMY NEW STRUCTURE

At its Scientific Assembly in September 1973, IAGA adopted a new structure which will take effect on 1 January 1974. The former Commissions and Working Groups will be dissolved and replaced by five Divisions and several other bodies which are listed below. The name of the Chairman of each Division precedes those of the three Co-chairmen some of whom had not yet been confirmed at the time of printing *IAGA Bulletin No. 12*.

DIVISION I. — *Internal Magnetic Fields.*

J. C. Cain (USA)

K. M. Creer (UK), W. D. Parkinson (Australia), T. Yukutake (Japan).

DIVISION II. — *Aeronomic Phenomena*

B. A. Tinsley (USA)

M. Ackerman (Belgium), H. Rishbeth (UK), A. Vallance-Jones (Canada).

Topics :

1. Structure, composition and dynamical processes of neutral and ionized constituents.
2. Solar fluxes, and photochemistry of ionized and neutral constituents, including excited species.
3. Atmospheric quantal emissions, including auroral processes and air-glow.
4. Ionospheric irregularities, including small-scale auroral structures.
5. Ionosphere-magnetosphere interactions, including large-scale auroral structures.
6. Upper atmosphere-lower atmosphere interactions.
7. Aeronomy of other planetary atmospheres.
8. Laboratory experiments of aeronomical interest.

DIVISION III. — *Magnetospheric Phenomena*

C.-G. Fälthammar (Sweden)

R. Gendrin (France), T. Obayashi (Japan), D. J. Williams (USA)

Topics :

1. Magnetic fields, electric fields and current systems, including relevant ground observations.
2. Magnetosheath, magnetospheric boundary and plasma penetration.
3. Distribution and properties of magnetospheric plasmas.
4. Energetic particle population including cosmic ray entry.
5. Magnetic oscillations, waves and wave-particle interactions.
6. Magnetic storms and substorms, including aurora-magnetosphere relations.
7. Magnetosphere-ionosphere interactions.
8. Magnetospheres of other planets.
9. Laboratory experiments of magnetospheric interest.

DIVISION IV. — *Solar Wind and Interplanetary Magnetic Field*

Officers to be designated later.

Topics :

1. Structure of the solar wind and the interplanetary field.
2. Interplanetary plasma physics.
3. Interaction of the solar wind with unmagnetized bodies.

DIVISION V. — *Observatories, Instruments, Indices and Data*

P. H. Serson (Canada)
P. N. Mayaud (France)
R. Pastiels (Belgium)
M. Sugiura (USA)

INTERDIVISIONAL WORKING GROUP. — *Relations between External and Internal Magnetic Variations.*

A. A. Ashour (Egypt)
C. A. Onwumechili (Nigeria)

INTERDIVISIONAL COMMISSION ON HISTORY

E. J. Chernosky (USA)

INTERDIVISIONAL COMMISSION ON ANTARCTIC RESEARCH

T. Nagata (Japan)

INTER-UNION AND INTER-ASSOCIATION WORKING GROUPS

1. (with URSI) The auroral oval and its extension into space.
2. (with URSI) Physics of the plasmopause.
3. (with IAMAP) Stratospheric and Mesospheric processes.

* * *

RESOLUTIONS

Among the Resolutions adopted at the II Scientific Assembly of IAGA, the following are of interest to URSI :

2. — IAGA, *recognizing* the importance of the continued study of natural electromagnetic phenomena and the fact that man-made sources of electromagnetic energy continue to increase in a way that tends to obscure these natural phenomena, *recommends* that adhering countries make an effort to set aside reservations in which man-made sources of electromagnetic energy in the frequency range of interest to IAGA are excluded so as to preserve such areas in which natural electromagnetic phenomena can be studied in years to come.

3. — IAGA, *considering* that SI Units are achieving international recognition as a single standard for worldwide use, *recommends* adoption of SI Units in the field of geomagnetism. Specifically IAGA recommends that :

- (1) (a) Values of the geomagnetic “field” be expressed in terms of the *magnetic induction* B (SI Unit tesla = weber/metre²).
- (b) If it is desired to express values in gamma, a note should be added stating that “one gamma is equal to one nanotesla”.
- (2) (a) Values of “intensity of magnetization” be expressed in terms of *magnetization* M (SI Unit ampere/metre).
- (b) If it is desired to express values in e.m.u., a note should be added stating that “one e.m.u. is equal to 10^3 ampere/metre”.
- (3) (a) Values of susceptibility be expressed as the ratio between *magnetization* M and the *magnetic field* H .
- (b) If, during the transitional period, it is desired to use values of susceptibility in e.m.u., a note should be added stating that “ χ_{SI} is equal to $4\pi\chi_{e.m.u.}$ ”.

10. — IAGA recommends the use of the term “magnetic pulsation”, or simply “pulsation”, instead of “micropulsation” for the following reasons :

- (a) The amplitude of pulsations is often large with respect to the main field in the outer magnetosphere.
- (b) The wavelength of pulsations may be large with respect to the size of the Earth.

11. — IAGA *recommends* the addition of two classes of pulsations to the existing classification : Pc6 for continuous pulsations with periods longer than 600 seconds and Pi3 for irregular pulsations with periods longer than 150 seconds.

21. — IAGA, *recognizing* that data and records of observations made in previous epochs will be of great importance in the study of the long-term variation of the aeronomic and geomagnetic aspects of the earth and its environment, *recommends* that each country take appropriate action to catalogue and to preserve such historically important data and to advise the scientific community of their availability.

SYMPOSIA : GRENOBLE 1975.

In accordance with IUGG rules, most of the scientific sessions at the IUGG General Assembly will be on topics of joint interest to two or more

of the Associations in IUGG and do not deal with topics of interest to URSI. IAGA proposes, however, to arrange two special 1 1/2 day symposia jointly with URSI and COSPAR on :

1. Transport phenomena and structure in the thermosphere and exosphere (proposed conveners : A. F. Nagy and H. Rishbeth).
2. Physics of the plasmopause (proposed convener : T. R. Kaiser).

A Symposium on Analysis Techniques for Non-stationary Signals has also been proposed, to be arranged after consultation between URSI and IAGA.

CONSULTATIVE COMMITTEE ON ELECTRICITY OF CIPM

Note. The following brief summary is based on the Minutes of the meeting (ref. CCE/72-26) signed by F. J. Lehany (Chairman) and A. E. Bailey (Reporter). Readers of the URSI Bulletin who wish to have further information about specific items are invited to write to the Secretary General of URSI.

The Working Group on Measurements at Radio Frequencies met at Sèvres on 10-11 October 1972 under the chairmanship of F. J. Lehany. URSI was represented by Mr. P. O. Lundbom (Chairman, Commission I) who also represented his laboratory (RIND, Stockholm).

The following topics were discussed at the meeting :

I. — PROGRESS AND RESULTS OF INTERNATIONAL COMPARISONS.

- I.1. Measurement of low powers at 3 GHz.
- I.2. Dielectric quantities at 10 GHz.
- I.3. Measurement of low powers at 10 GHz.
- I.4. Voltage at 1 GHz.
- I.5. Attenuation at 30 MHz.
- I.6. Attenuation at 10 GHz in waveguide.
- I.7. Attenuation in coaxial line at frequencies below 8 GHz.
- I.8. Methods to be adopted for future international comparisons.

II. — PREFERRED FREQUENCIES FOR INTERCOMPARISONS.

The Group noted the NPL suggestion that it was advantageous to restrict calibrations to certain preferred frequencies so as to avoid excessive work in maintaining standards at all frequencies.

III. — FUTURE INTERCOMPARISONS.

The list of planned intercomparisons is given in Appendix 1.

IV. — OTHER BUSINESS.

It was noted that several designs of coaxial connector for 75 ohm lines were becoming available and the view was expressed that there should be the fullest possible compatibility between connectors used for precision measurements. The members were asked, as individuals, to make the organisations responsible for national and international standard specifications aware of this question.

The next meeting of the Group is planned for 1975.

APPENDIX 1

Programme of Future Intercomparisons

1. — AGREED COMPARISONS.

Pilot and participating laboratories have been proposed.

- Differential phase shift in waveguide WR 90 at 9.0, 9.8 or 10.0 and 11.2 GHz
- Attenuation in coaxial line at 7.0 GHz
- Voltage in coaxial line at 1 MHz
- Power in waveguide WR 12 or WR 15 at 65 GHz
- Power in waveguide WR 28
- Power in 14 mm coaxial line at 6 GHz
- Electric field strength : 75-150 MHz
- Horn gain : 10 GHz
- Low attenuation at 10 GHz
- Attenuation at 30 MHz
- Power flux density at 2.45 GHz
- Low temperature (77 K) noise at 4 GHz in waveguide

2. — DEFERRED COMPARISONS.

Although these intercomparisons are considered to be desirable, final arrangements have not been made.

- Noise in coaxial line at frequencies between 1 and 8 GHz
- Magnetic field strength : 1-30 MHz
- CW laser power

- Pulsed laser power and energy
- Comparisons in 75-ohm coaxial line

3. — COMPARISONS EXCLUDED.

Because of lack of support, no action will be taken on the following intercomparisons :

- Q of inductor in 1 to 50 MHz range
- Medium temperature noise in waveguide WR 15 (58-64 GHz)
- Attenuation in waveguide WR 12 (60-90 GHz).

UTC TIME STEP 1 JANUARY 1974

The Bureau International de l'Heure has announced that a positive leap second will be introduced at the end of December 1973. As recommended in Annex 1 of CCIR Report No. 517, the sequence of dates of the UTC second markers will be as follows :

31 Dec. 1973	23 h 59 m 59 s
31 Dec. 1973	23 h 59 m 60 s
1 Jan. 1974	0 h 0 m 0 s

INTERNATIONAL GEOPHYSICAL CALENDAR 1974

The operational edition of the International Geophysical Calendar for 1974 has been issued by the International Ursigram and World Days Service and copies are available from Dr. P. Simon, Ursigrammes, Observatoire, F-92190 Meudon, France, or Miss J. V. Lincoln, WDC-A for Solar-Terrestrial Physics, NOAA, Boulder, Colorado 80302, USA.

The reverse side of the Calendar gives a brief outline of recommended astronomical and geophysical programmes of observation, including special observing periods designated in connection with GARP.

International Geophysical Calendar for 197

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

JANUARY

S	M	T	W	T	F	S
		1	2	3	4	5
6	7	8	9	10	11	12
13	14	15	16	17	18	19
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FEBRUARY

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MARCH

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APRIL

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JUNE

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JULY

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AUGUST

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SEPTEMBER

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OCTOBER

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NOVEMBER

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DECEMBER

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JANUARY 1975

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- 15 Regular World Day (RWD)
- 16 Priority Regular World Day (PRWD)
- 19 Quarterly World Day (QWD) also a PRWD and RGD
- 9 Regular Geophysical Day (RGD)
- 13 Day of Solar Eclipse

- * Micropulsation Interval Day
- 10 11 World Geophysical Interval (WGI)
- 3 Day with unusual meteor shower activity Northern Hemisphere
- 4 Day with unusual meteor shower activity Southern Hemisphere
- 20 21 Airglow and Aurora Period

Notes: GARP Special Periods: AMTEX -- February 14-28; GATE -- June 25-July 14, July 27-August 16, August 30-September 19 (tentative); DST -- all year; WWW -- all year but especially GATE periods. See reverse for details.

MEMBER COMMITTEES OF URSI ; URSI COMMISSIONS

The lists reproduced below give the names and addresses of :

- (a) the members of the Board of Officers;
- (b) the Presidents and Secretaries of the URSI Member Committees;
- (c) the Chairmen, Vice-Chairmen and Official Members of URSI Commissions I-VIII.

The information is based on the records in the URSI Secretariat on 15 November 1973. It would be appreciated if notification of changes or corrections could be sent to the Secretary General in Brussels before 15 May 1974 for inclusion in the June issue of the Bulletin. The next full list will appear in the issue dated December 1974.

BOARD OF OFFICERS

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Secretary General : Dr. C. M. Minnis, Place Emile Danco, 7, B-1180 Brussels, Belgium. Tel. 43.76.78. Cables : URSISEC Brussels.

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Secretary : Dr. J. L. Locke, Astrophysics Branch, National Research Council of Canada, Ottawa, Ontario K1A 0R8.

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Secretary : Dipl. Eng. Y. Sirkeinen, Helsinki University of Technology, SF-02150 Otaniemi.

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Münnich F. u. 7, Budapest V.

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Secretary : Dr. G. d'Auria, Istituto di Elettronica, Facolta di Ingegneria,
Via Eudossiana 18, I-00184 Roma.

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Secretary : Prof. Y. Taki, Faculty of Engineering, University of Tokyo,
7-3-1 Hongo, Bunkyo-ku, 113 Tokyo.

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Secretary : M. Aoud, Division des Télécommunications, Ministère des PTT, Rabat.

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President : Prof. F. L. Stumpers, Philips Research Laboratories, Eindhoven.

Secretary : Dr. ir. J. B. H. Peek, Philips Research Laboratories, Eindhoven.

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President : Mr. L. W. Martin, NZ Broadcasting Corporation, Bowen State Building, Bowen House, Wellington 1.

Secretary : Mr. G. J. Burt, Physics and Engineering Laboratory, DSIR, Private Bag, Lower Hutt.

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- Silver, S. (see Assembly, URSI General — Miscellaneous : General Policy).
- Simon, P. (and J. P. Legrand — see Solar flare forecasting).
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