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INTERNATIONAL UNION OF RADIO SCIENCE

U.R.S.I.

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INTRODUCTION

Acknowledgment

The XVIII General Assembly of URSI was held at the Universidad de Lima at Monterrico in August 1975. It seems appropriate at the outset to offer our sincere thanks to all those who contributed to the preparation of the Assembly and in particular :

— to our hosts, the Peruvian National Committee of URSI, under the sponsorship of the Peruvian Government and, in particular, its Ministers of Education and of Transportation and Communication, and the Instituto Geofisico del Peru;
— to the Organising Executive Committee and to the national sponsoring institutions which gave their invaluable support;
— to the Chairmen and Vice-Chairmen of the URSI Commissions, and others who were responsible for the planning of the scientific sessions, and to the speakers who participated in them;
— to UNESCO for its subvention which ensured the presence of URSI and other scientists;
— to the international scientific organisations which sent observers to the Assembly.

Outline of the Assembly

The URSI Council, consisting of representatives of the Member Committees of the Union, met on 5 occasions between 8 and 19 August. The Resolutions adopted by the Council and by the URSI Commissions are reproduced at the end of this volume. The business transacted by the Council and the Commissions is reported elsewhere in summary form.

The Opening Plenary Meeting on 11 August was held in the Teatro Felipe Pardo y Aliaga in Lima. Following the addresses of the Minister of Education and other Peruvian and URSI personalities, the winners of the Balth. van der Pol and the J. H. Dellinger Gold Medals and of the Appleton Prize received their awards.

In addition to the scientific sessions of the URSI Commissions, four Symposia were organised dealing with wave phenomena in the Earth's

ionised environment, with the radio noise environment and with the teaching of electromagnetics in relation to telecommunications.

During the Closing Plenary Meeting, the outgoing President, Prof. W. J. G. Beynon, and the Secretary General summarised the decisions made by the Council during the Assembly. Dr. J. A. Saxton, representing the Director of CCIR, referred to the need for closer cooperation between URSI and CCIR. Following the formal transfer of the Presidency, Monsieur J. Voge expressed appreciation of his election and declared the XVIII General Assembly of URSI closed.

List of URSI Office-bearers and Officers of Member Committees

Following the elections in Lima, the members of the Board of Officers, the Officers of Commissions, etc. are as given below.

The list of Presidents and Secretaries of URSI Member Committees is based on information available in the URSI Secretariat on 14 May 1976.

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Mr. J. A. Ratcliffe (UK),
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(1) Deceased on 15 December 1975.

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OPENING PLENARY MEETING

11 August 1975

The Opening Plenary Meeting was held in the Teatro Felipe Pardo y Aliaga, Lima. During the first part, the Meeting was addressed by the President of the Peruvian URSI Committee (Dr. A. A. Giesecke), the Rector of the Universidad de Lima (Prof. Antonio Pinilla), the Minister of Education (General de Brigada EP Ramon Miranda Ampuero) and the President of URSI (Prof. W. J. G. Beynon).

Opening Remarks

Dr. Giesecke's Opening Remarks

Mr. Minister, Mr. President of URSI,

It is with great pleasure that we have now realised our long held desire to be hosts to the many distinguished scientists who have come to Peru from so many parts of the world to work together, during the next thirteen days, in the context of the XVIII General Assembly of the International Union of Radio Science.

In August 1972, during the previous General Assembly in Warsaw, the Peruvian Chargé d'Affaires invited the URSI Council, on behalf of our Government, to hold this Assembly in our country. As you know, the Council voted favourably and accepted our invitation. We realise that this decision was a difficult one because of the traditional tendency to select a country that is nearer to the centre of gravity of the majority of the activities associated with URSI; thus, for the first time, the URSI General Assembly is being held in Latin America. We take this also as a recognition of the increasing scientific contributions made by Peru in the field of radio science. Huancayo and, more recently, Jicamarca are names which are to be found in very many papers in the scientific literature.

The organisation of the General Assembly has not been an easy task and it has involved many people, both in Peru and in other countries.

Unfortunately, it is inevitable that there may be some minor difficulties which we hope that you will kindly overlook.

I have much pleasure in thanking the Ministry of Education, the Ministries of Transportation and Communication and of Foreign Relations, as well as the University of Lima, the Instituto Geofisico del Peru and, of course, the General Secretariat of URSI for their support and help. Certainly, a most important objective of this Assembly, for you and also for ourselves, is that we take the opportunity to have a fruitful exchange of new knowledge, to renew old friendships and to establish new contacts, to understand each other better and, not the least important, that you should learn something about Peru, its past and its present, and that you should gather your own personal impressions of our present reality.

In the name of my colleagues I thank you again for coming here and I wish you much success in your work. Finally, when you later return to your homes, we hope that you will do so with the idea that you will come back soon to Peru.

Professor Pinilla spoke about the place of man in society and about the concept of a New State based on the discovery of effective methods of governing with justice and liberty. Such a New State would emerge from constructive criticism of state bureaucratic and parliamentary systems of government. In his address, Prof. Pinilla referred to the philosophical, legal, administrative and organisational problems associated with the creation of a New State and to the rôle in it of the Universities as centres for education and training, and for liberal thought and criticism.

Address of the Minister of Education

It is most agreeable for us that Peru should be the host country for this very important meeting which today brings together scientists from all parts of the world in the first General Assembly of the International Union of Radio Science to be held in Latin America. The Revolutionary Government of the Armed Forces notes with great interest this scientific event, the more so because one of the principles of the revolutionary process which we are experiencing is to foster and promote international cooperation in building an effective community of free and sovereign nations, no matter how small they may be or appear to be since they are all part of the scientific and cultural wealth of humanity. So, in consequence, developments in

science and technology must be pursued and must take place among us under conditions of mutual respect and aid.

Without any doubt, today it can be said that an understanding of human behaviour, on the one hand, and of the control of nature on the other, are being achieved at an increasing rate because of developments in scientific thought and of the new instruments, often most remarkable, which modern technology has made possible. We are conscious that, to a large extent, science and technology do not belong to us the members of the third world. Moreover, so long as they are developed by other hands and under inequitable conditions, the dependence from which we wish to be liberated will persist. Furthermore, we know that the gap between the developed and the developing countries will become greater in the measure that inventions and discoveries contribute increasingly to the generation of new inventions and discoveries, each more surprising than its predecessor, which tend to widen the gap.

It is worth pointing out very frankly, therefore, that the peoples of the world, and especially those of the less developed countries, have not always been able to view such scientific developments without alarm; there is a fear that the results of research may accentuate even more the power of the stronger over the weaker peoples, and that the ghost of further exploitation or of war may lurk behind each discovery, no matter how good the integration or how apparently innocuous it may be. We believe that this is certainly not the thought that is in the minds of those of you here today. We are confident that each one of you has the greatest faith in man and his destiny and that the dangers of the misuse of science are far away from this Assembly although, unfortunately, they are imminent in other places at other latitudes.

For Peru, this event is especially important, not only because of the very high professional and academic status of the scientists assembled here today and the broad range of subjects that you will discuss in your Commissions, but also because of the unique geographic characteristics which make our country particularly attractive for scientific studies and research. For example, I may refer to research on our natural resources through the application of space technology, on the changing physical characteristics of our ocean and our glaciers, on seismic activity, and on the equatorial electrojet which may also be considered as a natural resource. All of these fields are of special concern to us, and your discussions may result in important contributions to them.

For many years we have been studying the anomalous behaviour of the equatorial ionosphere; our station at Huancayo has provided one of the

longest series of uninterrupted ionospheric observations and these data continue to interest the world scientific community. The observations from Huancayo are incorporated in an index number which is used by the International Telecommunication Union in the selection of frequencies for radio communications. Similarly, the observatories at Jicamarca, Ancon and Arequipa, and also the Instituto Geofisico del Peru, have provided data and results of research which form the basis of the Peruvian contributions to the scientific sessions of this Assembly. In addition, there are the activities in our university centres and in other institutions of the public sector such as INICTEL, ENTEL and CONIDA (1).

Our country has recently begun to use sounding rockets for studies of the upper atmosphere and, in particular, of the ionospheric conditions that are so peculiar to our low latitude. The rocket data are examined together with other data obtained simultaneously at our ground-based observatories. There are similarities between the characteristics of the atmosphere at equatorial and at polar latitudes. At low latitudes, these can be studied away from the complexities introduced by the aurorae and the polar magnetic field, and thus the equatorial region arouses interest among scientists throughout the world.

My remarks have referred mainly to the activities of Peru in the subjects which are of interest to this Assembly, but these activities represent only a part of our contribution to the great efforts being made by the world community in the search for new knowledge that will benefit mankind.

Finally, let me draw attention to a vital requirement for the attainment of the objectives of this Assembly. This is the need to work with the conviction that science and technology are investments of high priority which must be developed in such a way that they do not deal only with short-term activities and objectives, but that they can solve the concrete problems which directly concern each of our countries.

We are confident that this Assembly will certainly meet fully the expectations that it has aroused internationally. We hope that its results will enable us to deal more effectively with the maintenance of peace, and the improvement of the well-being of all humanity without distinction of race, creed or nationality. It is with this faith and this hope that today the Revolutionary Government of Peru has asked me to offer you not only a welcome

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(1) INICTEL : Instituto de Investigacion y Capacitacion en Telecommunicaciones.
ENTEL : Empresa Nacional de Telecommunicaciones.
CONIDA : Comision Nacional de Investigacion Desarrollo Aerospacial.

but also the fraternel and sincere embrace of a people which is building its own destiny.

Reply by the President of URSI, Prof. W. J. G. Beynon

Mr. Minister, Prof. Pinilla, Dr. Giesecke, Ladies and Gentlemen,

My first task is to express, on behalf of all members of URSI, our warm appreciation of the invitation from the National Committee of Peru to hold this, the XVIII General Assembly, in this ancient city of Lima. I would also like to thank you, Mr. Minister, for honouring us with your presence at this Opening Meeting. For many of us, Peru has long been one of those far-away mystical South American countries with a history of civilisations going back many, many centuries. Few of us ever thought we would have the opportunity of actually visiting this ancient and fascinating land, and still less did we think that in 1975 we should meet here at an URSI General Assembly. When I knew that I would be coming here for this meeting, I consulted a well-known guide book and these were the opening words of the entry on Peru : "You will not need quinine, a sun-helmet or a " machete to visit Peru, but bring along a good supply of superlatives". The guide book proceeded to inform its readers that "Peru is a country " in which something new can turn up every day" and one such new thing turned up at 05.39 this morning in the form of an earthquake tremor ! I am not sure whether Dr. Giesecke can confirm the truth of the statement in the guide book but this is indeed an intriguing prospect and I look forward to the next two weeks with some real anticipation.

In 1952, URSI held its X General Assembly in Sydney and made history by being the first Scientific Union to hold a General Assembly in the Southern Hemisphere. The present General Assembly will be URSI's second excursion into the Southern Hemisphere and our first into the tropics. Those who have had first-hand experience of organising a General Assembly will know only too well what a major undertaking it is in terms of both the cost and the call which it makes for substantial time, effort and energy, often on the part of a small band of local workers. At the outset of this Assembly, I would wish to thank the members of the Peruvian Organising Committee, led by Dr. Giesecke, for all that they have done not only to ensure the success of our scientific meetings, but also to take care of us during our stay here.

In the radio-science field, mention of Peru immediately brings to mind two names, and the first is Huancayo. Those of you who have worked in the ionospheric field will not need to be told anything further about Huancayo. For those who are, dare I say, less privileged, I ought to explain that in the earliest days of radio sounding of the ionosphere, the Carnegie Institution of Washington, very generously and very wisely, decided to establish and maintain two ionospheric observatories outside the USA. One was established at Watheroo in Western Australia. The second station was sited in the equatorial zone and, in fact, exactly on the magnetic equator; this was, and still is, the ionospheric station at Huancayo. In the 1930's three stations — Washington, Watheroo and Huancayo — collectively formed a key part of the small group of routine sounding stations then in existence, and many of the basic features of the ionosphere came to be understood as a result of the regular, reliable data from this trio of stations — one of them here in Peru.

It should be added that, in the decade before the start of the ionospheric observatory in 1933 at Huancayo, the Carnegie Institution had already started magnetic observations in 1922, earth-current measurements in 1926 and seismological observations in 1931. Of course, for many years all these geophysical observatories have been very successfully maintained by Peruvian scientists and they continue to hold an honoured place in the annals of geophysical science.

The second name in Peru which comes to the mind of the ionospheric physicist is associated with the second phase in the development of ionospheric soundings. This was initiated in the 1960's with the development of the incoherent scatter technique and I refer, of course, to the Jicamarca Observatory. Apart from any other reason, the fact that the Huancayo and Jicamarca observatories are both here, would indeed be sufficient grounds for an ionospheric worker to make a pilgrimage to Peru. But before some of my colleagues in the Union start reminding me that URSI is not concerned only with the ionosphere, I must quickly add that we all know full well that Peru contains many treasures besides geophysical observatories, and we eagerly look forward to seeing, at first hand, something of those splendours of earlier civilisations with which your country abounds.

Mr. Minister, Dr. Giesecke, once again let me say, on behalf of all the delegates and observers at this URSI Assembly, how grateful we are to be given this opportunity of meeting in Peru and how much we appreciate all the preparatory work which has been carried out by you and your

colleagues to ensure the success of our meetings and our general comfort during our stay.

* * *

After an interval during which a number of Peruvian folk-songs were presented by local artistes, the President of URSI took the chair and invited the Secretary General to present his Report.

Report of the Secretary General

As required by our Statutes, I have prepared a number of detailed reports and these have been submitted to your representatives in the URSI Council which is meeting during the present Assembly. However, I have the additional responsibility of presenting to the delegates a summary of the principal activities of the Union during the past three years.

One of the objectives of URSI is to encourage the discussion and the dissemination of the results of scientific research in our field. As in the past, the Union has been associated with the organisation of international symposia on a wide variety of subjects covering the areas of interest of all our eight Scientific Commissions. Since the Warsaw Assembly, 20 such symposia have taken place in 12 countries. In many cases the responsibility for the local organisation of these events has been in the hands of the URSI Member Committee of the country concerned, and I think it is appropriate for me to express the appreciation of the Board of Officers, and indeed of the Union, for the work which our Member Committees have undertaken so as to ensure the success of these international events.

Most of those who participate in symposia agree that one of the main reasons for attending them is the opportunity presented to make personal contact with scientists from other countries working in the same field. These informal contacts are important, and their value is in no way diminished by the fact that many of the papers will be published and widely circulated after the close of the symposium.

In this connection it is worth pointing out that URSI does not encourage the publication of isolated volumes containing the collected papers presented at international symposia. In the present flood of scientific publications, such volumes tend to be forgotten in the few libraries which possess them, and their contents are not fully covered in the abstracting journals. The policy of URSI is rather to encourage authors to publish their papers

in the recognised journals where they will be easily accessible to anyone who uses the services of a good scientific library. Certainly this procedure may result in the rejection of some of the papers presented at symposia, but noone will criticise the insistence of most journals on the maintenance of high standards through the use of referees.

Before leaving the subject of meetings, it seems worth recording the fact that URSI was represented at three specially arranged events in 1974 : the centenary of the World Meteorological Organisation, the centenary of the birth of Marconi, and the 50th anniversary of the first vertical incidence ionospheric soundings in the UK and the USA.

As in the past, contact has been maintained between the Member Committees of URSI and the international Secretariat in Brussels through the medium of the *URSI Information Bulletin* which continues to appear at quarterly intervals. Following a recommendation of the Finance Committee in 1972, we consulted our Members about the value of the contents of the *Bulletin.* There was general agreement on the need to continue publication of the *Bulletin*, but several worth-while suggestions were made about the relative importance of various types of information. As a result of this investigation, several changes in editorial policy were made with the result that the number of pages is now about half what it was during the period 1969-1972.

URSI has continued to provide partial support for the *INAG Bulletin*, issued by the Ionospheric Network Advisory Group, which has played an important rôle in ensuring the widespread application of the revised rules contained in the 2nd edition of the *URSI Handbook of Ionogram Interpretation and Reduction.* The *Handbook* is now available also in the French, Japanese, Russian and Spanish languages, thanks to the considerable efforts made by members of our Committees in France, Japan, the Soviet Union and Argentina. The question whether or not to continue to produce the *INAG Bulletin* will be discussed by the Publications Committee of the URSI Council.

Considerable doubts were expressed about the value of the first *Review of Radio Science* which was published at the time of the URSI Assembly in 1972. However, it was decided to prepare a new edition for the present Assembly and the question whether to continue with this publication in future will be discussed in the URSI Council.

Inter-Union Commissions, when properly organised, provide a satisfactory means of ensuring joint consultation between several Unions on matters of common interest. URSI and the Union of Geodesy and Geophysics are the constituent Unions in the Commission which deals in a

very satisfactory way with the borderline subject of radio-meteorology. Consideration is at present being given to the possibility of extending the terms of reference of this Commission to cover the relatively new subject of radio-oceanography.

URSI, the International Astronomical Union and the ICSU Committee on Space Research work closely together in the Commission on the Allocation of Frequencies for Radio Astronomy and Space Science. The united front presented by the scientists represented in this Commission has been very effective in our negotiations with the International Telecommunication Union. I must point out, however, that representatives of CCIR and IFRB are always invited to attend the meetings of the Commission and that their advice concerning the problems of obtaining satisfactory frequency allocations for scientific research is very valuable and is always most welcome.

The Commission for Studies of the Moon has not been so successful as an inter-Union forum, mainly because it has tended to operate independently of the parent Unions. URSI withdrew as a member in 1973, but discussions are at present in progress concerning the creation of a new Commission with wider terms of reference including the Moon and the planets. It is intended that this Commission shall be a coordinating body which will work closely with the Unions.

URSI has a direct interest in the work of two of the Permanent Astronomical and Geophysical Services : the Bureau International de l'Heure and the International Ursigram and World Days Service. Since URSI is represented in the Council of the Federation of Astronomical and Geophysical Services, we have been able to ensure that these two Services receive a fair share of the limited funds provided by UNESCO and by the International Council of Scientific Unions.

Several Committees of ICSU are concerned with the coordination of international scientific projects of various kinds, some of which are continuations of the type of work begun during the International Geophysical Year. URSI is represented in the Committees which deal with Antarctic Research, Space Research, Solar-Terrestrial Physics, and Science and Technology in Developing Countries. The execution of the projects in question and the provision of the necessary financial support are the responsibilities of the national scientific academies which agree to participate in them.

The management of the finances of the Union has been a matter of concern to the Treasurer and the Board of Officers, especially during the past two years. We are all familiar with the rapid increases in costs of all kinds

and there are few countries where the rate of increase is less than 10 % per year. Naturally URSI has felt the effects of these increases and will continue to do so during the next three-year period. At the same time there has been a serious fall in the value of our income because of the decrease in the value of the dollar relative to many other national currencies.

The final result of decreasing income and increasing expenditure has been to reduce our reserves to a very low level as compared to what they were in 1972. It is only thanks to the existence of these reserves that URSI has been able to maintain its activities during the past three years and to meet the very heavy costs of the present Assembly. The Finance Committee set up by the URSI Council last week is considering this difficult situation but, even if economies of various kinds are made, it seems inevitable that it will be necessary for the Council to approve a considerable increase in the contributions payable by our Member Committees.

I cannot leave the question of finances without referring to the important grants received each year from UNESCO via the grant made by UNESCO to ICSU. These grants have been of particular value during the past two years and I must express to UNESCO our deep appreciation of this support of the scientific activities of our Union. Unfortunately, because of the increasing cost of maintaining its own activities and those of its Committees, ICSU has found it necessary to reduce the size of the grants made to many of the Unions, including URSI. Thus URSI will be obliged in future to depend to an even greater extent than in the past on the financial support provided by its Member Committees and the Academies of Science which they represent. I am sure that the Treasurer and the Board of Officers would wish me to express their thanks to our Member Committees for the prompt payment of their annual contributions, especially under the present difficult circumstances.

In recent years both UNESCO and ICSU have expressed the opinion that scientific research should be more closely concerned with the achievement of results of practical value, especially to the developing countries of the world. It is easy to imagine that some of the other Unions are involved in such useful projects as the development of artificial fertilisers and of new types of food plants designed to increase the world's food supply, with the conservation of water resources, with methods for forecasting earthquakes, and so on.

In URSI it is less easy to point to work in progress which will lead to results of this kind in the immediate future. On the other hand it must be remembered that the extensive national and international radiocommunications networks, which are now taken for granted even in many

developing countries, are the end-products of research, often of very basic character, which was the subject of discussion in URSI circles 5 or 10 or 15 years ago. Past research work on the use of microwaves for radio-communications combined with the exploitation of artificial earth satellites will, in a few years time, open up the possibility of educational radio broadcasts designed to reach large and widely-scattered populations, but requiring only small numbers of teachers. These will be of particular value in certain developing countries. Clearly URSI must continue to encourage basic research while at the same time bearing in mind that the research scientist can also be of help in the attainment of objectives of practical value.

URSI was founded in 1919 with, as its primary objective, scientific studies in the field of radiocommunications. The recommendations for the reorganisation of URSI, which the Board of Officers has submitted to the Council at this Assembly, are based on the view that radiocommunications science is still the branch of research on which URSI must concentrate its attention. At the same time it will be desirable to maintain and to improve URSI's contacts with CCIR which have been a feature of our activities for many years. In recent years these contacts have been greatly assisted by the fact that the Director of CCIR was Mr. Jack Herbstreit who has been an active participant in many URSI Assemblies and who is with us today. I have recently visited his successor, Mr. Kirby, in Geneva and I am confident that, with his help, we shall have little difficulty in developing still further the links between, on the one hand, the research scientist and, on the other, the engineers whose responsibility is the central coordination of the world radiocommunications networks.

Since 1952 it has been a tradition in URSI to move successive General Assemblies from one continent to another. But this is only our second visit to the Southern Hemisphere and it is the first occasion on which we have met in Latin America where, for many years, there have been Member Committees not only here in Peru but also in Argentina, Brazil and Mexico. However, those of us who, at some time or another, have been interested in geophysics will feel at home in Peru because one of the earliest ionospheric sounding stations was established in Huancayo many years ago and also because, more recently, the observatory at Jicamarca has established a world-wide reputation for its work on the incoherent scatter technique for studies of the upper atmosphere.

The initiative for inviting URSI to Peru came from the President of the Peruvian URSI Committee, Dr. Giesecke, and I am sure that many of us will be grateful for the opportunity thus provided to visit Latin America

for the first time. For me, this is my second visit, because I spent a week here last February when I was able to meet Dr. Giesecke and the members of his Committee and to discuss the many organisational questions associated with URSI Assemblies. Although some unexpected problems have arisen since then, particularly with regard to the location of the Assembly, these were outside the control of the local Committee and I am sure that, thanks to the efforts that Dr. Giesecke and his colleagues have made, they need not interfere too seriously with the success of this Assembly.

Before concluding this report, I must draw your attention to the new flag presented to the Union by the URSI Committee in Poland. Many of you will recall that the President of this Committee, Prof. Smoliński, announced the intention to make this gift in 1972 during the Assembly in Warsaw. In 1973 the flag was actually handed over in the URSI Secretariat in Brussels by the Polish Ambassador to Belgium. It was accepted, on behalf of the Union, by Prof. Charles Manneback, Treasurer of URSI for many years and now one of our senior Honorary Presidents. This is the first occasion I have had of thanking Prof. Smoliński and the Polish Committee in public for this very welcome gift.

Finally, may I assure Prof. Christiansen, Dr. Robinson and the members of the Australian Delegation that we still possess the well-worn flag presented by the Australian Committee 21 years ago on the occasion of the Assembly held in Sydney in 1952. It has been displayed at all the Assemblies since then and we intend to preserve it as a memento of the first URSI Assembly to be held in the Southern Hemisphere.

Address of the President, Prof. W. J. G. Beynon

Introduction

One of the purposes of the Presidential Address at a General Assembly is to provide an opportunity for the President to present, to the general body of URSI members, an account of the stewardship of the Board of Officers over the past three years. This is the eighteenth occasion on which an URSI President has addressed a General Assembly and you may legitimately wonder whether there is anything really new to be said. In some ways the triennium 1972-75 for URSI differed from earlier inter-Assembly periods but, in some important ways too, the basic problems which face an

organisation like ours do not really change very much. Since 1972 much of our time and attention has been taken up with the question of internal reorganisation which was specifically remitted to us by the URSI Council in Warsaw. This is an important question and I shall come to it later, but meanwhile let us remind ourselves that our Union has, over the years, had to face many problems of one sort or another, and it has always adapted itself successfully to the needs of the time. We can have every confidence that URSI will do so again.

At the outset I should like to extend a very warm welcome to those who are representing other international scientific bodies at this Assembly. COSPAR is represented by Prof. K. Rawer, CCIR by Dr. J. A. Saxton, IUCAF by Dr. J. W. Findlay, IUCRM and IAMAP by Dr. B. R. Bean, IUWDS by Miss Virginia Lincoln, SCOSTEP by Dr. F. Johnson, IUGG and IAGA by Prof. A. F. Nagy and SCAR by Mr. W. R. Piggott.

Just as radio waves in their travel recognise no national frontiers, so, in a somewhat analogous way, the pursuit of radio science leads us into other scientific fields. Hence it is not surprising that URSI should have close links with many other scientific organisations and we are indeed pleased to have representatives of these organisations with us at this Assembly. I may add that three other international scientific organisations, ICSU, BIPM and WMO, have kindly sent messages of goodwill to URSI on this occasion.

I should also like to extend a warm welcome to those who may perhaps be attending an URSI Assembly for the first time. As many of you know, at this Assembly we are experimenting with open scientific symposia and it may well be, indeed I hope it is the case, that some of you are here for the first time. If so, may I, on behalf of the Board of Officers, welcome you and express the hope that you will come again and again.

A sad but inevitable consequence of the march of time is that, at each Assembly, we have the solemn responsibility of recording the passing, since we last met, of some of our distinguished and most respected colleagues. Unfortunately the list before us on this occasion contains the names not only of older colleagues, long retired from URSI, but also of some who were still very much involved with the affairs of the Union.

In the category of URSI figures of years ago, we sadly record the passing of Father E. Gherzi, a former Director of the Zi-ka-wei Observatory, at the great age of 87; Sir Robert Watson-Watt, the inventor of radar, and the man who coined the word "ionosphere"; Mr. Robert Naismith, one of the early ionospheric workers, and Prof. Balta Elias who was, for some years, the Spanish Official Member for Commission III. In a somewhat

younger age group we mourn the deaths of Professor Stanisław Ryżko and Dr. Herbert Heffner, both of whom were present at recent General Assemblies. We also mourn the loss of two scientists who were still very actively concerned with URSI, Professor K. M. Siegel and Professor N. M. Brice, colleagues who would have been with us at this Assembly and who merit special mention.

It is with profound sorrow that we have to record the passing of the Chairman of one of our Commissions. Professor Siegel had for many years been an active figure both within the US National Committee and at URSI international meetings and the news of his sudden death on 14 March this year, at the early age of 52, has indeed come as a great shock to all of us.

Born in New York City, Keeve Siegel graduated at the Rensselaer Polytechnic Institute in 1948, obtained his Master's Degree two years later and was then appointed a research associate in the University of Michigan Research Institute at Ann Arbor. At this period he was working on a wide range of problems from radar cross-sections to upper atmospheric physics. A former President of URSI, Professor Samuel Silver, recalls his impressions of Keeve Siegel at this time in these words : "I recall how impressed " I was by the then youngster's insight into problems of scattering of " electromagnetic waves by spheroids, ellipsoids, cones, etc. — all problems " of extremely great mathematical complexity. While others in the field " were struggling with analytical difficulties, Professor Siegel was able, by " ingenious insight, to develop radar cross-sections for such complex " structures as aircraft. What was even more impressive was the breadth " of his interests and the range of problems he could and would tackle " simultaneously. His drive and intellectual energy was prodigious."

Professor Siegel first attended an URSI General Assembly as US delegate in Boulder in 1957 and he was an active participant in every Assembly since then. At the Ottawa Assembly in 1969, he was elected Vice-Chairman of Commission VI and succeeded to the office of Chairman at our Assembly in Warsaw in 1972. The last occasion on which I met Professor Siegel was at the meeting of Commission Chairmen in London last summer when he told us of the arrangements which he had made for the Commission VI meetings at this Assembly. But Professor Siegel was not merely active within Commission VI and at our General Assemblies; he was also very actively concerned with the symposia on electromagnetic theory, sponsored by URSI, between Assemblies. He was indeed a dedicated servant of the Union and, with his widow Ruth, we greatly mourn his loss.

Neil Brice was killed in an air crash on 31 January 1974 and he was just 40 years of age. Born in Australia, he graduated in the University of

Queensland and later received his doctorate from Stanford University. In the period 1956-1962 he participated in radio studies in Antarctica and in 1966 he joined the staff of Cornell University where, at the time of his untimely death, he was Professor of Electrical Engineering.

Professor Brice made many original contributions to knowledge in the fields of aurora, ionosphere and magnetosphere. He was a member of the US delegation at our General Assembly in 1972 and contributed to discussions in Commission IV on controlled geophysical experiments.

A measure of the high regard in which his colleagues in URSI held Neil Brice and his achievements is afforded by the fact that the Board of Officers has posthumously awarded him the Dellinger Gold Medal for 1975. The world of radio science has indeed suffered a great loss in his untimely death and, on behalf of all us in URSI, I extend our deepest sympathy to Mrs Brice and her family.

The obituaries of these URSI colleagues of both the distant and the immediate past are recorded in the annals of our Union and I would now ask you to stand for a moment in silent tribute to them.

Let me now mention some of the happier events of the past three years. The Secretary General, in his report, has already referred to the gift of a new flag to URSI by the Polish National Committee. We now have two flags, one from Australia and one from Poland, and without making a too-pointed suggestion, may I now invite each chief delegate to note this fact. I will add that, in my view, it would certainly look very nice at our General Assemblies, and it would bring back memories of some very happy times, if the Union had a set of such flags commemorating all our various meeting places over the years.

It is really not unexpected that, from time to time, one or other of our distinguished colleagues in URSI should receive further international recognition and on this occasion it is indeed a great pleasure for me to record that, in October 1974, the Nobel Prize for Physics was awarded to two radio scientists who have long been actively associated with Commission V. I refer to Sir Martin Ryle, and to Dr. Antony Hewish who is with us to-day. This award is particularly gratifying to us in URSI because you will recall that in 1963 we awarded the Balth. van der Pol Gold Medal to Sir Martin Ryle, and in 1972 we awarded the John H. Dellinger Gold Medal to Dr. Hewish. We offer our warmest congratulations to our two colleagues. Indeed I hope that this success establishes a precedent and that recipients of our Gold Medals can perhaps feel that they are on their way to becoming Nobel Laureates.

Internal Reorganisation

I turn now to the current position in the long-continuing debate on internal reorganisation of the Union. The recommendations which the Board of Officers is submitting to the Council at this Assembly are included in the documents available to Chief Delegates. Before coming to these, I think it will be useful to summarise briefly the discussions which led up to the formulation of these recommendations.

At the Warsaw Assembly in 1972, the Council of the Union resolved :

1. that URSI shall retain its status as an independent Union of ICSU;
2. that, in order to stimulate the scientific activities of the Union, the URSI Board of Officers, in consultation with the Chairmen and Vice-Chairmen of Commissions, be authorised to examine the internal structure of the Union and to recommend modifications appropriate to this objective;
3. that, where consultation or collaboration between URSI and another Union seems to be desirable, the Board of Officers and the Chairmen of Commissions be encouraged to establish the appropriate direct contacts.

The third part of this resolution was particularly concerned with problems of overlapping scientific interest which had arisen between Commissions III and IV of URSI and the International Association of Geomagnetism and Aeronomy. The contributions of URSI scientists to ionospheric and magnetospheric studies have been, and continue to be, very substantial and in these last years some of us have been very worried about the overlap of our activities in this area with those of IUGG. On this matter I am happy to report that, in the past three years, quite successful progress has been made. I think it has to be accepted that, no matter how neatly we may try to define URSI's scientific interests, some aspects of the subject will always border on and overlap with the interests of another scientific body. It is almost inevitable that the free pursuit of radio science will lead us into other fields of scientific endeavour. We must, of course, try to keep these areas of overlapping interest to a minimum and recognise too that the areas concerned will change from time to time but, with the ever increasing inter-disciplinary nature of science, we may never be completely free of the problem. Following the Council recommendation at the Warsaw Assembly, the Chairmen of Commissions III and IV have had fruitful discussions with officials of IAGA and agreement has been reached on the

formation of Inter-Union Working Groups to deal with the topics in which interests overlap. These Groups are subject to review at the General Assemblies of both URSI and IAGA, and I hope that they will prove to be a satisfactory mechanism for dealing with problems associated with those scientific areas which are of legitimate interest to both URSI and IAGA.

I turn now to the second point in the Council resolution : the examination of the internal structure of the Union by the Board of Officers and the Chairmen and Vice-Chairmen of Commissions. Immediately after the Warsaw Assembly, the Board established two groups to discuss this matter : one consisting of the Chairmen and Vice-Chairmen of Commission III, IV and VIII, and the other consisting of Chairmen and Vice-Chairmen of Commissions I, II, V, VI and VII. The meeting of representatives of Commissions I, II, V, VI and VII was held in September 1973 and it proved to be the occasion for a very profitable exchange of views; a full report of the meeting appeared in *URSI Bulletin No. 189.*

The Chairmen and Vice-Chairmen of Commissions III, IV and VIII met with the Board of Officers in March 1974. At this meeting we had before us written comments which had been submitted by a number of Member Committees and there was a wide-ranging discussion of the scientific topics which should be covered by these Commissions and of the Commission structure.

In addition to these specially convened meetings of Commission representatives, in the past three years there has been a very considerable interchange of views by correspondence, and there have been long discussions within the Board itself. The final outcome is the set of recommendations which the Board of Officers issued after its meeting in London in December last and which will be discussed by the Council at this Assembly.

First, a recommendation is made that studies of the scientific aspects of telecommunications using electromagnetic waves should be a primary objective of the Union. We then proceed to list 12 topics on which it would seem appropriate to concentrate the activities of URSI and it is recommended that this list be reviewed at each General Assembly. Two new topics referred to in this list are radiobiology and radio-oceanography.

We then suggest a revised Commission structure. In this, the total number of Commissions is limited to eight; in most cases the Commissions proposed correspond to the existing ones, but with two exceptions. It is suggested that Commission VI should be split into two Commissions : one on electromagnetic theory, and the other on communication systems and system theory. The second exception follows from the suggestion that there

should be one Commission to cover wave phenomena in natural ionised media in place of the two we have at present. It is suggested also that URSI should set up a Committee to deal with matters of joint interest to ITU and ourselves, and a Committee on the teaching of electromagnetics and telecommunications science.

We then make a quite new suggestion, namely that the organisation of symposia be a major part of the scientific activities of URSI, and that such symposia should be open to full participation by all interested scientists. It is suggested that the open symposia be organised both at, and in the interval between, General Assemblies. This proposal is already being tried out at this Assembly where some of the scientific sessions of Commissions III, IV and VIII are taking the form of open symposia. It is further suggested that, in this matter of open symposia. URSI should cooperate closely with other organisations so as to ensure a reasonable overall programme.

Additional recommendations are that there be discussions with other national and international organisations on possible cooperation in the matter of remote sensing studies and optical communications.

These in brief, are the recommendations of the Board on internal reorganisation. It has been a long haul reaching the present measure of agreement and, in the past three years, views have been expressed quite frankly, and indeed sometimes quite bluntly, both verbally and in correspondence. The Council of URSI gave preliminary considerations to these recommendations at its meeting on Friday last and, apart from some matters of detail, the recommendations received a considerable measure of support. Further discussion on them is now proceeding and we hope to have general agreement on all outstanding matters before the end of this Assembly.

Symposia sponsored by URSI

It would be quite wrong to suppose that the activities of URSI are limited to triennal General Assemblies. Every year our Union is involved, directly or indirectly, in several international symposia concerned with some aspect of radio science. In this address, I can refer to only a few of the many meetings with which URSI has been concerned since 1972.

The past three years have included two anniversaries of interest to URSI which were celebrated by special meetings. April 25, 1974 marked the centenary of the birth of Guglielmo Marconi and our Italian colleagues kindly invited representatives of URSI, including your President, to par-

ticipate in the celebration meetings held in Bologna, and also in an international symposium on Radio Propagation in Natural Media held a little later in Florence.

December 12, 1974 marked the 50th anniversary of the historic pioneer ionospheric experiment by Appleton and Barnett and this was celebrated by a special two-day discussion meeting in London organised jointly by the Royal Society and by URSI. Again URSI was well represented in the list of speakers and the occasion provided an opportunity for a nostalgic reunion of workers from many countries, especially of those directly involved in those historic early years of radio sounding of the ionosphere.

Nearly all the Commissions of the Union have been involved in one or other of the many international symposia which have taken place in the past three years. URSI was well represented at the Conference on Precision Electromagnetic Measurements held in London in July 1974. A recommendation that URSI should become a cooperating sponsor of these Conferences was made at the Ottawa General Assembly in 1969; the organisers felt that this recognition by URSI of the international interest in these Conferences should be appropriately marked by holding the Conference for the first time outside the USA and by inviting the President of URSI to participate in the opening ceremony. This I was indeed happy to do.

URSI was a cosponsor of the International Symposium on Electromagnetic Wave Theory in 1974 which was also held in London immediately following the CPEM meeting and here again the organisers kindly invited me to speak on behalf of the Union at the opening meeting. The Union also cosponsored, with the IEEE, the International Symposium on Information Theory held in the USA in October 1974. Our Union was also involved in the organisation of an International Symposium on Electromagnetic Compatibility held in May this year at Montreux and we cooperated in the organisation of a symposium on the Biological Effects and Health Hazards of Microwave Radiation held in Warsaw in September 1973. In September 1974, an URSI Specialist Meeting on microwave scattering and emission from the Earth was held in Switzerland. This was the first international meeting devoted entirely to this subject and it was attended by 70 participants from 13 countries. In the area of Commission III, a conference on incoherent scatter was held at Tromsø, Norway, in June 1973 and in June 1974 URSI joined with other Scientific Unions and with COSPAR, in organising a Symposium on Solar-Terrestrial Physics in Sao Paulo, Brazil. URSI, also with COSPAR, cosponsored a Symposium on Beacon Satellite Investigations of Ionospheric Structure held in Moscow in October 1974.

Teaching of Radio Science

You may recall that at the Warsaw Assembly it was decided to establish a Working Group on the Teaching of Radio Science. Later, the Board decided to organise a half-day symposium at this Assembly on "The teaching of telecommunications science and electromagnetics". A number of colleagues from different countries have kindly accepted invitations to speak and we look forward to an interesting session on this topic.

Venues of General Assemblies

At the conclusion of the Warsaw Assembly in 1972, no firm decision had been taken on the venue for the Assembly in 1975. It had been agreed by the Council that member countries should express their preference by postal vote, and the result was overwhelmingly in favour of meeting here in Peru. The organisation of a General Assembly is a very considerable undertaking calling for much voluntary effort and goodwill and long-term planning, and the Board felt that this was too serious a matter to be left to chance. At its first meeting after Warsaw, the Board considered the problem of venues for future General Assemblies and decided to establish a small group of representatives from different regions of the world to keep under review possible locations for future General Assemblies, and to make proposals to the Council. This group, under the Chairmanship of Prof. Alan Waterman, has been in touch with several URSI Member Committees and, thanks to their efforts, I am glad to report that we are now in the very happy position of having a number of invitations which will assist us in our future planning. In fact the situation was such that the Council, at its first meeting at this Assembly, was able to decide on the venue for the next Assembly. I should like to thank Prof. Waterman and his colleagues for their most helpful work during these past three years and also those Member Committees which have kindly come forward with invitations. For your information, the XIX General Assembly of URSI will be held in Helsinki in 1978.

Publications

At our last Assembly the Publications Committee recommended that the triennal volume entitled *Progress in Radio Science* should be discontinued

but that publication of a *Review of Radio Science*, which first appeared in 1972, merited a further trial. At that meeting Professor Bowhill kindly accepted our invitation to act as General Editor of the *Review of Radio Science 1972-1974*. In the event, Professor Bowhill has also been responsible for its printing in sufficient numbers for distribution to registered participants at this Assembly. At a meeting of Commission Chairmen and Vice-Chairmen in July 1974, doubts were expressed about the desirability of continuing with this publication, but it was agreed that a final decision should be deferred until we had seen the volume prepared for this Assembly. Meanwhile, I am sure you would join me in according our warmest thanks to Professor Bowhill and his co-editors for the work which they have so generously put into the preparation of the Review.

Finances and Administration

Under normal circumstances the subject of finance is one which is a matter of a routine report by the Secretary General or the Treasurer. However, I need hardly remind you of the current widespread economic and financial difficulties which now beset many countries and which, in these last years, have caught up with our Union. As many of you will know, we depend for our income almost entirely on two main sources : annual contributions from Member Committees, and a grant from UNESCO which is transmitted to us through the International Council of Scientific Unions. According to our Statutes, a decision to increase the annual contribution of Member Committees can be taken only at a General Assembly. At Warsaw, the Council decided to maintain the unit contribution for Member Committees at its old level of $200 for the years 1973 and 1974, and to increase it to $250 from 1 January 1975. Budgets for the 3-year period 1972-75, prepared by the Finance Committee on the basis of these contributions, were also approved by the Council in Warsaw. In March 1973 the Board of Officers was informed that a further devaluation of the dollar since the Assembly had already invalidated the prepared budgets and that, if we were to meet our commitments, we would be forced to draw on our Reserve Funds. At the same time the Treasurer and I wrote to Member Committees inviting them to make some voluntary additional contributions over and above their normal subscriptions for the period 1974-75. I am glad to say that a number of Committees generously responded to that appeal and I wish to place on record the appreciation of the Board for that help. However, at every Board meeting since 1972,

the Secretary General has had to report a steadily deteriorating financial situation. At our meeting in Brussels in March this year, he reported that, during the three-year period 1972-74, expenditure exceeded income by no less than $26,000 and that the Union had been able to meet its commitments only by drawing very heavily on its Reserve Funds to the extent that these funds will be practically exhausted by the end of 1975. A further blow to our finances came when ICSU, faced with problems of its own, including that of a continuing increase in the number of Scientific Unions and Committees affiliated to it, adopted a revised basis for determining the subventions made to the Unions. Under the new scheme, URSI has suffered a 30 % cut in the annual grant it receives from ICSU. We have protested very vigorously to ICSU about this measure but have failed to get the decision changed. The Board of Officers has considered all possible ways of meeting this very serious financial situation and is putting forward a number of recommendations for consideration by the Council at this Assembly. These include proposals that symposia sponsored by URSI should be financially self-supporting, that the meeting of the Coordinating Committee prior to General Assemblies be discontinued, and that we should no longer pay the travel expenses of Vice-Chairmen to Assemblies, save in exceptional circumstances.

We have also considered ways in which the current expenditure on the administration of the Union might be reduced. As many members will have seen from the report of the Board meeting of March 1973 published in the *Information Bulletin*, the Secretary General, Dr. Minnis, informed the Board at that meeting that he would not be a candidate for re-election in 1975. In the very serious financial situation which has developed in the past two years, the Board has been forced to the conclusion that, without a very substantial increase in the unit contribution payable by Member Committees, the Union cannot continue to meet the costs of maintaining, at its present level, the permanent salaried Secretariat at Brussels and that, when Dr. Minnis retires, the present post of salaried Secretary General should be replaced by an honorary appointment. At its meeting in December 1974, the Board asked me to write to our Member Committees inviting nominations for the post of honorary Secretary General. As reported in *Information Bulletin No. 194*, three nominations have been received and Council will be invited to elect one of these candidates at this Assembly.

UNESCO Woman's Year

Finally, let me refer to a completely non-radio matter but one which, nevertheless, merits brief mention in this address. I refer to the fact that the year 1975 has been designated by UNESCO as "Woman's Year". Now, you may ask, what has this to do with URSI ? I could reply that UNESCO is a major contributor to the finances of our Union and that, for this reason alone, it would be prudent of us to support UNESCO and to pay tribute to our URSI women-folk. However, it would be quite wrong to degrade such a tribute to our ladies by associating it with financial considerations. Over the years, delegates to our General Assemblies have enjoyed the loyal and devoted support of their wives, and the presence of these ladies has, without question, contributed to the success of our meetings. There is one such lady who was once a very familiar figure at these Assemblies, and who merits a special word on this occasion. It was she who, in November 1974, addressed these words to our Secretary General : "In a month or so, I will bring, or send to you, three more Medals for " 1975, 1978 and 1981. After 1981 if I am still alive (I am 81 now) I mean " to continue to give the Medal." The Medal is the Balth. van der Pol Gold Medal and the lady is Mrs Le Corbeiller (or more familiarily to many of us Mrs Netta van der Pol). With your permission, I propose sending this message to Mrs Le Corbeiller : "The delegates to the XVIII General " Assembly of URSI in Lima, Peru, send their warmest greetings and " express their appreciation of your continued generosity and encourage- " ment to radio research in providing Balth. van der Pol Gold Medals " for 1975, 1978 and 1981."

But, in this official Woman's Year, we pay a special tribute also to that small group of women who actively participate in the scientific and administrative activities of our Union. Looking through the membership of various international groups, I find four names which merit especial mention. In alphabetical order they are Mlle Bezprozvannaya who is a Member of the URSI Ionospheric Advisory Group; Miss Virginia Lincoln, Secretary of the International Ursigram and World Days Service Steering Committee and also of INAG; Mme Mednikova is a member of INAG and served in the former World-Wide Soundings Committee; Mlle Geneviève Pillet is Vice-Chairman of CCIR Study Group 6 and a member of INAG. These four ladies actively participate in the scientific work of URSI and in this international Woman's Year we menfolk salute them.

The fifth lady in my list is in a category by herself. From 1958 to 1974

she was our loyal, industrious and smiling Administrative Secretary, Mlle Yela Bogitch; since 1974, she has been our loyal, industrious and smiling Administrative Secretary, Mme Stevanovitch. We warmly congratulate her on her marriage and once again we place on record our sincere appreciation of her continued services to URSI.

Conclusion

To conclude, let me return for a moment to the question of reorganisation which we are discussing again at this Assembly. It is of course right and proper, and up to a point healthy, that we should indulge a critical re-examination and self-appraisal of what the Union is doing and of its relationship with other international scientific bodies but, if continued too long, debates of this kind are in danger of becoming sterile and indeed harmful to our organisation. URSI has now debated internal structure and external relationships for ten years and more and, as one who has during these years been near the centre of it all, let me say that in my view it is now time to conclude the debate, or at least reduce the tempo of it, and I feel sure this can be achieved at this Assembly.

This Union of ours has a long and proud tradition and, I repeat, URSI has always adapted itself to the needs of the time and doubtless will continue to do so. Furthermore, as in the past, if the occasion requires it, I am sure we shall change quietly and without fuss and, as always, it will be an evolutionary and not a revolutionary change. I think that URSI has an unique character among the Scientific Unions and those who have studied the history of URSI will know that in 1919, after the end of World War I, when URSI and a number of other Scientific Unions were being established, there were those who believed that the proper place for radio science would be within the Union of Physical Sciences. But there were some, like Ferrié, Eccles, Goldschmidt and others, who wanted an independent union for radio science and after much discussion they won the day. In 1934, fifteen years after URSI had been set up, in his Presidential Address to the V General Assembly in London, Eccles had this to say :

" I think that it was a bold step to create this Union. It meant mixing two
" types of men — the engineer and the physicist — and this might have
" promised dis-union rather than union. The difficulty was discussed in
" full and is now seen to be more apparent than real. As a matter of fact
" it solved itself by many radio engineers becoming physicists, and many
" physicists becoming engineers...

" It is largely because of the fascination of these wireless problems for " physicists that the International Scientific Radio Union has become such " a great success. The subject especially lends itself to interaction between " physicists and engineers... But [examples of] the mutual relationships " [between physicists and engineers] could be multiplied indefinitely, and " the result on the whole is that there has been a vast network of such " relationships established; which explains why to this day the combination " of engineers and physicists in this Union has been so stable."

I personally feel that Eccles' comments on the URSI of forty years ago still have a great measure of relevance to our recent long drawn-out discussions on reorganisation. Perhaps we need to remember that when we meet here in URSI, the emphasis is not on the fact that we are engineers or physicists, but that we are radio scientists and that it would be a mistake deliberately to tilt the organisation too much towards either engineering or physics.

Six years ago in Ottawa, when I was Chairman of a Working Group which Council established to consider the reorganisation question, I sought the opinions of a large cross-section of URSI colleagues. In these many discussions the one fact which continually emerged was that radio people, be they engineers or physicists feel a strong common bond; radio scientists know their own kind and feel the need to meet together in a Radio Science Union. It was not surprising to me that, at the Warsaw Assembly, the first point to be made by Council was that URSI should retain its status as an independent Union. Engineers, and experimental and theoretical physicists working together in the common field of radio science can accomplish much that they cannot achieve separately, and the URSI of the past achieved what it did because basically it recognised this fact. URSI has indeed always been an organisation which warmly welcomed into its midst radio scientists from any different fields who had something worthwhile to contribute to their particular aspect of the subject; and it must always remain so. Furthermore when we speak of URSI, let us remember we really speak, in large measure, of the leaders in the organisation. In 1975, as it was in 1934, and as it was away back in 1919 when our Union was founded, it is still the task of URSI to have the type of balanced organisation which will continue to attract not only the best radio engineers and the best radio physicists, but also the best research workers from all other scientific fields on which the study of radio waves may, in the future, impinge.

I now declare the XVIII General Assembly of URSI open.

Presentation of URSI Awards

During the Opening Meeting the URSI Awards for 1975 were presented.

Balth. van der Pol Gold Medal

The Medal was presented to Prof. Leopold B. Felsen of the Polytechnic Institute of New York by Prof. F. L. H. M. Stumpers, President of the Netherlands URSI Committee, who made the following remarks :

In making its Awards, the International Union of Radio Science commemorates some of its great leaders of the past. Their contributions were of great importance to the study of radio science and to raising the status of this Union in the world.

One of these leaders for about 40 years was Balth. van der Pol; it was to honour him, and to serve as a mark of appreciation to scientists working in the same domain, that his widow founded the Award which takes the form of a gold medal. She took much pleasure in presenting the Medal personally to the scientist who, in the eyes of the URSI Board of Officers and the Chairmen of Commissions, most deserved it. Since she is now well into her eighties, it is no longer possible for her to attend URSI General Assemblies in faraway countries, and she has asked me to present the Medal in her name.

The Award has been made, on this occasion, to Professor Leopold B. Felsen for his work on the application of ray-optical methods to studies of the propagation and diffraction of electromagnetic waves. He has studied both the possibilities and the limitations of this method by comparing its results with those of exact calculations. I have had the occasion to note the many papers published by Professor Felsen on this subject. I note also that the *Review of Radio Science* considered it a major event that the long-awaited book by Felsen and Marcuvitz had finally appeared. From personal experience, I also know that Professor Felsen is a very clear and lucid lecturer.

As you all know, van der Pol and Appleton were among the first to develop a scientific approach to radio wave propagation. Moreover, van der Pol stimulated a lot of work in his group in the Philips Research Laboratories, and I need only mention the names of Bremmer in wave propagation and of Bouwkamp in diffraction theory to show that the subjects which have been studied by our Gold Medal winner of today were near to van

der Pol's heart. Therefore it gives me particular pleasure to present the Balth. van der Pol Gold Medal to you, Professor Felsen, and to offer you our most cordial congratulations. Also I wish you the same success in your further studies.

J. Howard Dellinger Gold Medal

The Medal was awarded posthumously to Prof. Neil M. Brice for his theory of the Earth's plasmapause, the first tangible link between the ionosphere and the magnetosphere, and for his pioneering theoretical investigations of the physics of Jupiter's magnetosphere.

It was accepted, on behalf of Mrs Brice, by Dr. D. T. Farley. The presentation was made by Dr. F. S. Johnson, President of the United States URSI Committee, who made the following remarks :

J. Howard Dellinger was one of the pioneers in the United States in the field of radio propagation by reflection from the ionosphere, and he started the programme of ionospheric predictions in the National Bureau of Standards. Now that URSI is recognising anew that it must support and assist CCIR, it is appropriate and timely to note that Dellinger played the leading rôle in bringing the United States into contact with the activities of the CCIR.

Neil Brice advanced the understanding of the means by which the ionosphere is disturbed by magnetospheric processes, something essential to accurate prediction, and Dellinger would have appreciated the award, to Brice, of the Gold Medal which bears his name. It is a great tragedy that Brice died while still young in an air crash in the Pacific early in 1974. He is greatly missed at this Assembly by his many friends and associates.

I am very pleased to hand over the J. Howard Dellinger Gold Medal to Professor Donald Farley, an associate of Brice at Cornell University, who will accept the award on behalf of Mrs Brice.

Appleton Prize

The Prize was handed over to Dr. J. V. Evans of the MIT Lincoln Laboratory by Prof. W. J. G. Beynon who made the following remarks :

Sir Edward Appleton was a dominant figure in the affairs of URSI for about three decades. He was President of the Union for 18 years and also took a major part in running URSI's Commissions on radio propaga-

tion and on atmospherics. In fact he was Chairman of one or other of those two Commissions for 26 years. In 1931 he was Chairman of the URSI Sub-Commission on radio work during the Second International Polar Year and, 25 years later, he played a leading rôle in organising the major contribution which URSI made to the International Geophysical Year. Although he did not live to see the completion of the IQSY, the third major international cooperative project in geophysical science, he was again active within URSI in the preparatory phase of that enterprise. He was President of the Mixed Commission on the Ionosphere throughout its existence from 1948 to 1962. Appleton was a giant in URSI and it is doubtful whether we shall see his equal again.

In 1960 the XIII URSI General Assembly was held in London and the excellent financial support that we received from various sponsors was such that, when the Assembly was over and all our financial commitments had been met, we found ourselves with some surplus funds. On the death of Appleton in 1965, the British National Committee, of which I was then Chairman, decided to use these funds to establish the Appleton Prize to be awarded by the Council of the Royal Society acting in consultation with the URSI Board of Officers. The first Appleton Prize was awarded in 1969 at the Ottawa Assembly and the third is being awarded today to Dr. J. V. Evans, of the MIT Lincoln Laboratory where he is now Group Leader and Head of Research at the Millstone Hill Ionospheric Laboratory.

Dr. Evans pioneered the lunar radar technique for measuring total electron content in the ionosphere and has been the leader in the application of the incoherent scatter technique for ionospheric studies. He has also made outstanding contributions to lunar and planetary radar astronomy. Dr. Evans has long been concerned with the affairs of URSI at both national and international levels, and is currently Chairman of the Working Group on Incoherent Scatter Sounding.

It was my privilege to work closely with Appleton for some 27 years both in his ionospheric research and in the field of international science and I know that he would heartily approve the decision to award the URSI prize which bears his name to Dr. Evans. Incidentally, this is the second time within a year that Dr. Evans has been honoured by an award linked with the name of Appleton. Last December in London, at the invitation of the Institution of Electrical Engineers, he gave the X Appleton Memorial Lecture.

On behalf of both the Council of the Royal Society of London and the Board of Officers of URSI, I have great pleasure in handing over to you, Dr. Evans, the Appleton Prize for 1975.

CLOSING PLENARY MEETING

The Closing Meeting of the Assembly was held on 19 August in the Teatro Felipe Pardo y Aliaga in Lima.

Announcements

At the request of the President, the Secretary General announced :

(*a*) the results of the elections for the Board of Officers and the Chairmen and Vice-Chairmen of the new Commissions (see pages 6-8);

(*b*) the admission of Bulgaria as a member of URSI;

(*c*) the decision to hold the XIX General Assembly in Helsinki in 1978 at the invitation of the URSI Committee in Finland.

Relations with CCIR

The President referred to the long-standing and friendly relations between URSI and the CCIR, one of the technical advisory bodies of the International Telecommunication Union. He regretted that the Director of CCIR, Mr. Richard Kirby, had not been able to come to Lima but he was glad to welcome Dr. J. A. Saxton, who had been asked by Mr. Kirby to represent CCIR, and to invite him to make some remarks.

Remarks made by Dr. J. A. Saxton, representing CCIR

I know that Mr. Kirby, the Director of the CCIR, would have wished to be here with us today in Lima, had it been humanly possible for him. However, this could not be, and I consider it a privilege to have been asked by him to represent the CCIR in his stead. I was thinking what I should say to you but, after my arrival in Lima, I received the text of what Mr. Kirby would have said himself had he been here. So, with your permission Mr. President, I will read Mr. Kirby's text

TEXT OF THE MESSAGE SENT BY MR. R. C. KIRBY, DIRECTOR, CCIR

I sincerely regret that it has been impossible for me to attend the XVIII URSI General Assembly in this my first year as CCIR Director. I envy your visit to historic Peru, and the opportunity for talks with many friends in radio science. I wish you a most successful and historic Assembly.

The link between CCIR and URSI is an old and intimate one that has been fruitful for both organizations in their rôles for international cooperation. As you know, the liaison has not only been a formal one, for many leaders in URSI have also been leaders in CCIR. Particularly in the area of radio-wave propagation studies, research has been stimulated throughout the world by the practical needs of international telecommunication, and this has been of benefit to both radio science and international telecommunication.

The current discussions of a possible reorientation of URSI's interest towards communication science can only be warmly welcomed and supported. There are continuing needs not only for international science in radio-wave propagation, especially at frequencies above 10 GHz, but also for international studies in communication theory and coding, pattern recognition, network design, and principles of information processing and very wideband communication. URSI especially might serve to stimulate studies of totally new concepts of electrical communication.

But it would be wasteful for URSI to try to be all things to all people in communication science. The scope of this field is so large, and URSI's strengths so particular, as to warrant very careful identification of its future rôle. One must recognize the already active rôles of the professional technical societies, and of the International Telecommunication Union. Many of you in URSI already represent the leadership of professional technical societies serving individual members throughout the world. You know very well that these societies have, in some cases, large and active international memberships. There are also successful international liaisons among many of these societies. Their scientific publications and technical symposia, frequently international, are central to the educational, scientific and professional objectives of these societies. URSI has enjoyed their cooperation in radio science, and must cultivate the same cooperation in the broader field of communication science.

On the other hand, the International Telecommunication Union is the inter-governmental treaty organization responsible for coordination of international telecommunication. The technical studies underlying this

coordination are the responsibility of the International Consultative Committees, the CCIR for radio and the CCITT for telephone and telegraph. Through a continuous programme of meetings, study groups, and interim working parties, the CCI's carry out these technical studies. The numerous reports and recommendations of the CCI's, adopted by government administrations in the CCI Plenary Assemblies, provide the basis for technical coordination, arrangements, systems, and standards for international telecommunication. These also guide the development of radio regulations and procedures for efficient utilization of the spectrum. Their technical scope covers all fields of electrical communication, from microwave relay and satellite communication, broadcasting and television to switching and transmission networks for data, video, telephone, and telegraph communication. The vitality of these activities is suggested by the triennial output of CCIR alone of more than 5,000 pages of recommendations, reports, questions and study programmes dealing with the most advanced aspects of communication science and technology.

The URSI rôle in communication science can be a unique and important one as it has been in radio science. URSI is a medium through which the national Academies of Science can exchange and correlate scientific information on an international basis. This unique relationship with the Academies of Science is not a feature of either the professional technical societies or the International Telecommunication Union. In my view, it is this relationship, together with a careful focus on the most basic aspects of communication science, which can provide a good basis for a future URSI rôle in communication science.

Dr. Saxton concluded :

I will add, Mr. President, that, in common with quite a few other delegates here, I have myself been closely involved in the activities of both the CCIR and URSI. Like Mr. Kirby, I too believe that the interaction which has existed for many years between the two bodies can be increased in value bearing in mind the direction in which URSI now proposes to turn its attention. I believe that the mutual benefit which the two bodies can derive from this interaction will be greatly enhanced by the joint URSI-CCIR Committee which the URSI Council has decided we should seek to establish. Speaking for myself, and also I believe for those generally engaged in CCIR studies, we shall look forward with great interest to seeing how the enhanced cooperation between URSI and CCIR, for which we all hope, will develop in the years ahead.

Closing Remarks of the President

Before I hand over to Monsieur Voge there are a few things I would like to say.

First I want to thank my colleagues on the Board for all the help they have given me in a period which has, I think, been quite important for the future of our Union. I will not be revealing any secrets if I say that there were times, particularly during my early days as President, when I did not see eye to eye all the time with all my colleagues! But, gradually, a great measure of mutual understanding developed and we were, in the end, able to agree on the reorganisation proposals and on other matters which will, I feel, help to secure the vigour and prosperity of URSI in the years ahead.

I would also like to thank the Chairmen and Vice-Chairmen of our eight Commissions who have given so freely of their time and energy in the service of the Union. Accepting office in URSI at any time is a labour of love, but in these last three years the Commission Officers have had more to do than is usual. It has been my policy to try to involve the Commission officials to the maximum possible degree in the affairs of the Union, because it is the Commissions, after all, which are URSI. In the last three years I have had quite considerable correspondence with several Chairmen on reorganisation and other issues, and I am deeply grateful for their response. I have said before that, in my view, the future of URSI will be determined, not so much by any paper plans which we may draw up, as by the quality leadership and dedication of our Commission Chairmen and in the past three years these qualities have indeed clearly been in evidence.

I would wish also to place on record my appreciation of the help I have received at all times from the Secretariat. To Dr. Minnis and Mme Stevanovitch I accord my very best thanks for their help in the last three years. As you will know, the cost of maintaining the Brussels office is a substantial part of the budget of the Union, and as I mentioned in my opening address to this Assembly, the Board of Officers had suggested to Council that in the near future we might have to make the post of Secretary General an honorary appointment. However, by making various additional economies, funds have now been found to maintain the present post on a part-time basis and Dr. Minnis will continue in office for the next three years.

In at least two ways this XVIII General Assembly will be marked as a turning point in the history of URSI. In the first place it will be remembered

as the Assembly in which reorganisation plans were finally adopted. The long years over which this question of external relationships and internal organisation have been under discussion have inevitably cast an air of uncertainty over our affairs. Now that the debate is over, I hope the Union can look forward to a period of stability, of prosperity, and of scientific achievement equal to any that has been known in the past. No one can say that we have not debated the issues fully but, of course, time alone will show the extent to which our plans have been well and truly laid.

The second distinctive feature of this Assembly has been the fact that we have experimented with the open-symposium type of scientific meeting. From my conversations with those closely concerned with the three symposia at this Assembly, I believe the experiment has been a great success and this should give confidence to those other Commissions who may, in the future, consider organising their scientific meetings along these lines.

But perhaps the most outstanding and memorable feature about this meeting is that it was the first General Assembly of URSI to be held in South America. Some time ago there were those who expressed considerable doubts about the wisdom of holding this Assembly in Peru — a country so distant from our Brussels headquarters — and I must confess that I too had moments of doubt. But now that we have reached the end of the Assembly, few can question the success of our meetings, and no small part of that success has been due to the efforts of one man — Dr. Alberto Giesecke. If any conference organiser has had problems to face, it has been Dr. Giesecke, and if any conference organiser has cheerfully met and overcome seemingly insurmountable problems, it has been Dr. Giesecke. He deserves our warmest and unqualified gratitude. But behind Dr. Giesecke there has been a team of loyal helpers, known and unknown : the members of the Peruvian Organizing Committee, the Rector of the University of Lima, the charming young ladies who have helped in the Secretariat, those who have helped with the projection of slides, those responsible for taking care of our good ladies — to all who have helped to ensure the success of this, the XVIII General Assembly of URSI, we say with deep sincerity — thank you.

It has been a privilege to come to Peru, and an unforgettable event to have visited Cuzco and Machu Picchu — those relics of a noble civilisation which has long passed into history and vague memory. For many of us, I think that to have stood in Machu Picchu helped us to see the problems of our time and of our Scientific Union in their true perspective.

And now all that remains is for me to hand over the office of President

of URSI to my colleague and good friend, Jean Voge, and to offer him every good wish for a successful and happy term of office.

M. Voge's Remarks

Thank you, Professor Beynon. It is with some considerable emotion that I accept from you the torch of URSI. For the past three years you have kept it burning brightly, in spite of the shortage of petrol, and you have made it throw its light unfailingly over the international scientific community.

Ladies and Gentlemen,

With your permission, I would like to say a few words in French. Firstly because French is one of the official languages of URSI but, above all, because my British and American friends have often suggested to me that my French was much easier to understand than my English.

J'ai été très sensible, — je le dis de tout cœur — mes chers collègues, à la confiance que votre Conseil et vous-même m'avez témoignée. J'en suis profondément touché et tiens à vous exprimer ma gratitude extrême pour cet honneur, dont je crains seulement de n'être pas suffisamment digne, quand je songe aux qualités de mes éminents prédécesseurs aux côtés desquels j'ai eu le privilège de travailler comme Président de Commission, puis comme Vice-Président : le Dr. Smith-Rose, le Professeur Koga, le Professeur Silver, le Professeur Dieminger, et vous-même, Monsieur le Président.

Je n'ai pas l'intention, vous vous en doutez, de vous présenter dès maintenant un programme. D'abord parce que c'est à votre nouveau Bureau et non à moi-même qu'il appartient de le définir. Et aussi parce que j'estime que ce n'est pas en prenant ses fonctions qu'un président doit faire un discours, mais quand il a déjà eu l'occasion d'agir et de faire ses preuves.

Ce que je peux vous dire cependant sans crainte de me tromper est que mon objectif principal — comme celui, j'en suis sûr, de votre Bureau — sera la réorganisation de votre Union, suivant les grandes lignes qui nous sont fixées par les décisions du Conseil. Mon ardeur à faire aboutir cette réorganisation sera d'autant plus vive que le mandat qui nous est donné correspond bien aux principes que j'ai moi-même défendus depuis quelques années. Mais je voudrais également rappeler la part déterminante qu'a prise dans leur élaboration et dans leur mise au point définitive notre vice-

président sortant, le Professeur Henry Booker, à qui notre Union doit rendre un hommage particulier. Si le fait de résider beaucoup plus près que lui de notre siège de Bruxelles a fait retenir ma candidature, je ne saurais m'aveugler au point d'oublier qu'il méritait beaucoup plus que moi l'honneur d'être porté à votre présidence. Je suis très conscient de tout ce que l'URSI doit à son prestige, à ses travaux scientifiques et à son activité inlassable dans un passé récent ou plus ancien. J'espère qu'il voudra bien continuer à nous faire profiter de son expérience et de ses précieux conseils.

Vous me permettrez aussi, je l'espère, en ce jour d'évoquer très rapidement la mémoire de mes deux illustres prédécesseurs français à cette présidence : le Général Ferrié, fondateur de l'Union en 1919 et le R. P. Lejay. Je n'ai pas connu le Général Ferrié, mais j'ai eu la chance et le plaisir de collaborer directement avec le Père Lejay pendant les 5 années — de 1952 à 1957 — où il a été président de l'URSI. Je ne doute pas que c'est en grande partie grâce à l'expérience des affaires de l'Union que j'ai acquise à ses côtés, dans une période particulièrement florissante de notre histoire, que je peux aujourd'hui lui succéder. Comme Sir Edward Appleton, ou le Professeur van der Pol, le Père Lejay appartenait à cette génération de radio-scientifiques dotés d'une très forte personnalité, qui défendaient leurs idées et leurs convictions avec beaucoup de vigueur et même de passion. Mais ils savaient aussi faire preuve de la plus grande gentillesse et prodiguer à leurs collègues ou leurs collaborateurs une amitié indéfectible et une assistance qui ne se démentaient jamais.

During the past ten days, we have had a series of meetings of great scientific value. We have also had the opportunity of appreciating the cultural heritage and the treasures of Peru at some of the ancient centres of human civilisation near Lima, and in the high mountains. Now we have come down to Earth again at the end of this URSI Assembly.

I am very happy to support fully the well-merited thanks which Professor Beynon has expressed to Dr. Giesecke and his colleagues in the Organising Committee and also to all those who have assisted in some way in ensuring the success of this occasion. I am confident that we shall long remember the Assembly that is now drawing to a close.

Finally, Ladies and Gentlemen, in closing this Assembly, may I wish you a pleasant journey back to your own countries. May I express the wish that I shall have the pleasure of meeting you again in three years time, in Helsinki, at the XIX General Assembly of URSI.

Muchas gracias y hasta la vista, or, for our Quetchuan friends — packarinkama.

REPORTS OF MEETINGS

URSI Board of Officers

The incoming Board met in Lima on 19 August 1975 immediately after the Closing Meeting of the General Assembly. Present : M. J. Voge, Profs W. J. G. Beynon, W. N. Christiansen, W. E. Gordon, V. V. Migulin, F. L. Stumpers, Dr. C. M. Minnis.

1. — Appointment of Treasurer

In accordance with Art. 36 of the Statutes, Prof. W. E. Gordon was designated as Treasurer of URSI for the period up to the end of the XIX General Assembly in 1978.

2. — Programme Coordination : 1978

In view of the problems encountered in Lima as a result of the decision to combine several open symposia with the General Assembly, it was agreed that it would be preferable to avoid the inclusion of independently organised symposia in the Helsinki programme in 1978. It was considered desirable to envisage a small group of people who would coordinate the whole programme and ensure that there was a minimum of interference between the activities of the individual Commissions and the symposia.

Prof. Stumpers was invited to consult the Chairmen of Commissions concerning their views on the Helsinki programme and to report his preliminary conclusions to the Board at its meeting in March 1976.

3. — Membership Committee

It was agreed to ask Prof. Migulin to supervise the activities of the Standing Committee on URSI membership which had been formed by the Council (Res. C. 7).

4. — Teaching of Telecommunication Science

It was considered desirable to investigate the possibility of closer links between URSI and those universities throughout the world that were engaged in teaching telecommunication science or related subjects. The President reported that he had discussed this subject informally with Prof. Booker who was particularly interested in it but he believed it would be necessary to examine it in more detail.

It was agreed to invite Prof. Booker to give some further thought to URSI'S rôle in teaching, and to future relations between the Union and the universities, and to submit a report to the Board for consideration at its next meeting.

Prof. Beynon was invited to make a recommendation to the Board concerning the desirability of publishing the papers presented at the half-day Symposium on teaching held in Lima during the Assembly.

5. — Rules for URSI Awards

Experience has shown that Member Committees have submitted very few candidates for the URSI awards. In view of this the Board felt that it would be desirable to create a broadly-based Nominating Committee which would be authorised to add its own candidates to those proposed by the Member Committees. The Nominating Committee would then prepare a short-list of recommended candidates for submission to the Board of Officers which would make the final awards.

A revised set of Rules for URSI Awards will be considered by the Board at its next meeting.

6. — URSI Secretariat

In view of the expiry, in November 1975, of the lease of the offices at Place Emile Danco, it was agreed that the President and Secretary General, in consultation with the Treasurer, should decide on the location of alternative office accommodation in Brussels and the date of transfer.

The Treasurer was asked to consider the future organisation of the URSI Secretariat, including the financial implications, and to report his conclusions to the Board.

Summary Report on Meetings of the URSI Council

The Resolutions and Recommendations adopted by the URSI Council, which met in Lima on 8, 9, 14, 18 and 19 August, are reproduced at the end of this volume.

MEMBERSHIP OF URSI COUNCIL : AUGUST 1975

President : Prof. W. J. G. Beynon.

Representatives of Member Committees :

Argentina	Prof. V. Padula-Pintos; Prof. J. A. Rodriguez
Australia	Dr. B. J. Robinson
Austria	Prof. O. M. Burkard
Belgium	Prof. J. Van Bladel
Brazil	Prof. Mauro Soares de Assis
Canada	Dr. J. L. Locke
Czechoslovakia	Prof. V. Zima
Denmark	Prof. E. Ungstrup
Finland	Prof. M. Tiuri
France	M. M. Thué
German Dem. Rep.	Prof. F. Wiegmann
Germany, Fed. Rep.	Dr. W. Becker
Hungary	Prof. K. Géher
India	Dr. A. P. Mitra
Italy	Prof. G. Barzilai
Japan	Prof. S. Okamura
Netherlands	Prof. F. L. H. M. Stumpers
New Zealand	Dr. J. E. Titheridge
Nigeria	Prof. O. Awe; Dr. G. O. Ajayi
Norway	Dr. E. Thrane
Peru	Dr. R. F. Woodman; Dr. A. A. Giesecke
Poland	Prof. S. Hahn
South Africa	Mr. R. W. Vice
Spain	Dr. E. Galdòn
Sweden	Prof. C. G. Aurell
Switzerland	Prof. W. Gerber
Taiwan	Mr. P. H. Kong

United Kingdom	Dr. J. A. Saxton
USA	Dr. F. S. Johnson
USSR	Prof. E. M. Zhabotinskij

The following Committees were not represented : Israel, Mexico, Portugal, Yugoslavia.

The following attended as Observers by invitation of the Council : Board of Officers and Secretariat : Prof. H. G. Booker, Prof. W. N. Christiansen, Prof. W. Dieminger, Prof. V. V. Migulin, M. J. Voge, Dr. C. M. Minnis and Mme Stevanovitch.

Prof. K. Serafimov (Bulgarian Academy of Sciences) was invited to attend the meetings following the admission of Bulgaria as a member of URSI.

Formation of Temporary Committees

Finance : J. A. Saxton (Chairman), W. Becker, A. P. Mitra and J. E. Titheridge. J. Voge (Treasurer) and C. M. Minnis (Secretary General) attended the meetings in an advisory capacity.

Publications : M. Thué (Chairman), K. Géher, S. Hahn.

Drafting Committee (General) : M. Thué, J. A. Saxton, C. M. Minnis, Mme Y. Stevanovitch.

Drafting Committee (Resolution on Reorganisation of URSI) : F. S. Johnson (Chairman), W. Becker, J. A. Saxton, F. L. Stumpers, M. E. Zhabotinskij, V. Zima.

Election of Board of Officers 1975-1978

The results of the elections were as follows :

President :	Monsieur J. Voge (France).
Vice-Presidents :	Prof. W. N. Christiansen (Australia), Prof. W. E. Gordon (USA), Prof. V. V. Migulin (USSR), Prof. F. L. H. M. Stumpers (Netherlands).

Secretary General : Dr. C. M. Minnis (UK).

Prof. W. J. G. Beynon (Immediate Past President) remains a member of the Board. The new Board later designated Prof. Gordon as Treasurer.

Election of Chairmen and Vice-Chairmen of Commissions

The Chairmen and Vice-Chairmen of Commissions were elected by the Council following the receipt of the list of recommended candidates submitted by each Commission (see p. 7).

It was recognised that it was desirable to continue to designate Vice-Chairmen to assist the Chairmen in carrying out their responsibilities. However, it was appreciated that it would be desirable to review the structure of the Commissions in 1978 and that there was no guarantee that the Vice-Chairmen would then automatically become Chairmen of their Commissions.

In order to avoid misunderstandings, it was agreed that the Commissions should be asked not to hold elections for Vice-Chairmen before the 1978 Assembly. It was decided also to ask each Commission to submit the names of at least two candidates, from different countries, since otherwise it was sometimes difficult for the Council to ensure a good geographical distribution of the officers of the Commissions.

Member Committees

It was noted with regret that the URSI Committees in Morocco and Sri Lanka had terminated their membership in 1973 and 1974 respectively. Enquiries about membership had recently been received from the Academy of Scientific Research and Technology in Cairo (Arab Republic of Egypt) but no application for membership had been received. *(Editor's note.* Following the later receipt of an application for membership, in December 1975, the Board of Officers admitted the Arab Republic of Egypt as a member in accordance with Ottawa Resolution No. 4).

The application for admission made by the Bulgarian Academy of Sciences was formally presented by Prof. K. Serafimov (Secretary of the Academy) and was accepted unanimously by the Council. It was understood that the President and Secretary of the Bulgarian Committee would be Prof. Serafimov and Dr. A. Spassov respectively.

It was agreed that further efforts should be made to attract new Member Committees and it was decided to form a Standing Committee on Membership with regional representation as follows : O. Awe (Africa), K. Géher (Europe), A. A. Giesecke (Latin America), S. Okamura (Asia). No Chairman was designated but the Board of Officers later asked Prof. V. V. Migulin (Vice-President of URSI) to be responsible for supervising the activities

of the Committee. The Committee will make recommendations to the Board about what steps should be taken, in their respective regions, to encourage the formation of new Member Committees.

Reorganisation of URSI

The discussions on the reorganisation of URSI were based on the proposals submitted by the Board of Officers, and reproduced in *URSI Inf. Bull.* No. 184, p. 23, which were accepted with minor modifications (see Res. C. 1., p. 126).

It was considered preferable not to create a single Commission, at present, to deal with all aspects of wave phenomena in ionized media. Instead, Commission G will deal with the use of the ionosphere in systems of radiocommunications and with the application of radio techniques to studies of the ionosphere. Commission H will be concerned with the theoretical aspects of wave phenomena in plasmas, including those in the magnetosphere.

Statutes

The Council recognised that several of the decisions it had made would require changes in the Statutes and authorised the Drafting Committee to prepare these and to submit them to Member Committees for formal approval by postal vote.

Standing Committee on Future Assemblies

The Council expressed its appreciation of the work carried out by Prof. Waterman and the members of his Committee. The Report presented by the Committee had enabled the Council to examine the various invitations and to make a decision about the location of the 1978 Assembly.

It was agreed unanimously that the Committee should continue its work and that it should be asked to submit a report to the Council in 1978 concerning invitations for the 1981 and 1984 Assemblies.

It was noted that Prof. Waterman wished to resign from the Committee in view of the fact that the USA would probably wish to submit an invitation for a future URSI Assembly. Prof. Waterman's resignation was accepted with regret and Dr. A. P. Mitra was designated as the Chairman

in his place. Dr. J. L. Locke (Canada) replaces Prof. Waterman as the north-American regional member of the Committee. The remaining members are Prof. V. Padula-Pintos (Latin America) and Prof. S. Lundquist (Europe).

Organisation of XIX General Assembly 1978

In Lima, several open Symposia were organised in association with the General Assembly. These symposia, and also the scientific sessions arranged by the Commissions, could be attended by all registered participants, including those who were not members of any delegation sent by a Member Committee.

It is intended to repeat this type of programme in 1978 in Helsinki. It was recognised, however, that the superposition of the open symposia on the normal programme for the General Assembly had created certain problems in Lima. Several suggestions were made for the resolution of these problems and have been submitted to the Board of Officers for consideration. It was proposed, for example, that a single member of the Board be designated to coordinate the overall programme for the Assembly and the associated symposia.

Future Symposia; Working Groups of Commissions

The Council did not have the opportunity to consider all the proposals submitted by the Commissions for symposia to be organised or cosponsored by URSI, or for Working Groups of the Commissions. It was agreed to authorise the Board of Officers to make final decisions on these matters, including the allocation of funds in support of the various scientific activities.

Publications

The Chairman of the Publications Committee presented his Report (see p. 77) which included recommendations concerning the various publications for which URSI is responsible.

In view of the doubts concerning the objectives of the *Review of Radio Science*, the Committee expressed the opinion that the contents of the *Review* were not intended for specialised readers, but rather for the information of people outside URSI who wished to have a concise summary of

the recent activities of the scientists associated with the Member Committees of URSI.

It was proposed that the 1978 edition of the *Review* be published by URSI and that its circulation should not be restricted to the registered participants at the General Assembly in 1978.

The Report of the Publications Committee was adopted.

Finances

The Council received a detailed report on finances, including proposals made by the Board of Officers, the main features of which were published in *URSI Inf. Bull.* No. 194, p. 26.

The Report of the Finance Committee dated 13 August (see page 58) was presented by the Chairman and discussed by the Council on 14 and 18 August. At the second meeting, the Council agreed on certain modifications of the recommendations made by the Finance Committee in its Report. The Chairman was authorised to prepare a Supplementary Report, in consultation with the Treasurer and the Secretary General, taking into account the decisions of the Council relating to income and expenditure for the period ending 31 December 1978. This Report was circulated after the Assembly to the Members of the Council and is reproduced on page 63.

The Council agreed to the proposal to introduce Membership Category 5A to provide an intermediate step between Categories 5 and 6.

Political Non-Discrimination

The Council noted the opinion formally expressed by the Board of Officers in March 1973 in response to the views expressed by the Council in Warsaw in 1972 (*URSI Inf. Bull.* No. 186, p. 19) and agreed that the text should become a Resolution of the Council.

Relations with ICSU

There was some discussion about the apparent decrease in the influence of the Scientific Unions in ICSU and about the degree to which the Unions are bound by decisions made by ICSU. The Board was asked to look more closely into the nature of the relations between ICSU and the Unions and to report back to the Council in 1978.

Relations with ITU

In view of the reorientation of the objectives of URSI and the intention to develop further the activities of the Union in telecommunication science, it was agreed that steps should be taken to strengthen the existing links between URSI and ITU, with particular reference to the technical committees of ITU : CCIR and CCITT. It was felt that there was a need for a standing URSI-ITU Committee and that ITU should be consulted about the formation of such a Committee, which would probably include representatives of CCIR, CCITT and URSI.

Votes of Thanks

At the final meeting of the Council, the Chairman, Prof. Dieminger, said he was sure that everyone would agree that he should draw special attention to Res. C. 17. He congratulated Dr. Giesecke and the Peruvian Organising Committee on the arrangements they had made for the Assembly and he believed that all the participants would recall with pleasure the very friendly manner in which they had been received. Dr. Giesecke's team of helpers had cooperated fully with the delegates in providing information and in helping to solve problems.

Dr. Giesecke expressed his appreciation of the kind remarks made by the Chairman and referred also to the excellent cooperation with the Universidad de Lima which had agreed to provide accommodation for the Assembly at very short notice. Dr. Giesecke hoped that the Council would consider returning to Latin America for a future Assembly.

Report of the Finance Committee

1. — Accounts for the years 1972-1974

The Finance Committee has examined the full accounts of URSI for the three years 1972-1974 audited by Gimson & Co., Chartered Accountants, London. The summarised accounts, as presented to the Council, are consistent with the audited accounts. It is recommended that the latter be published in the *Proceedings* of the present Assembly.

The Committee notes that expenditure exceeded income by $ 26,000 as compared with budgetted deficit of $ 5,500 (equivalent, in value, to $ 6,500

at 31 December 1974). The increase in the deficit results from (*a*) a decrease in income of approximately $ 14,000 due to devaluation of the US dollar and (*b*) an increase in expenditure of some $ 6,000 due to rising costs since 1972.

The Committee recommends the approval of the audited accounts for 1972, 1973 and 1974 and expresses its appreciation of the careful management of URSI finances by the Treasurer and the Board of Officers, especially in view of the difficult financial circumstances of recent years.

2. — Budget for the years 1976-1978

Since expenditure over the past three years has exceeded income by a large amount, the Finance Committee considers it imperative that there should be no further depletion of the Union's reserves and that, therefore, income over the period 1976-1978 should be at least equal to expenditure.

With no change from the pattern of expenditure on scientific activities and administration as it existed in 1974, it would be necessary to increase the annual contribution of Member Committees by a factor of about two. The Finance Committee agrees with the opinion expressed by the Board of Officers that this would be unacceptable and that ways of reducing this factor must be found.

The following economies are recommended by the Committee :

(*a*) that grants in support of symposia should be reduced from $ 4,000 to $ 2,000 each year;

(*b*) that the meeting of the Coordinating Committee should not be held in 1977, it being believed that the necessary work could be carried out mainly by correspondence;

(*c*) that URSI should bear the cost of attendance at a General Assembly of only one of the two officers of each Commission.

Noting that the Board has recommended the appointment of a non-salaried Secretary General and recognising that a period of overlap between him and the retiring Secretary General is essential, the Finance Committee recommends that Dr. Minnis be retained until 31 March, 1977, working half-time as Assistant Secretary General. The incoming Secretary General and Treasurer should, however, assume formal responsibility for their respective duties after the end of the XVIII General Assembly. It is further recommended that the Secretariat in Brussels and the services of the Administrative Secretary be retained.

The Finance Committee accordingly recommends a budget for the years 1976-1978 as given in Table I, where the figures are based on an assumed average rate of inflation of 15 % per annum over the first three years and 7.5 % per annum thereafter. It is recognised that this is an arbitrary assumption and the matter is commented on later in this report in the discussion of the required unit contribution.

The budget of Table I is based on 8 Commissions. If the Council agrees to the formation of 9 Commissions, following the recommendations made by Commissions III and IV at the XVIII General Assembly, namely not to become amalgamated as suggested by the Board, additional expenditure amounting to some $ 8,000 would be incurred over the three-year period. The total expenditure envisaged for 8 Commissions over the period 1976-1978 is thus $ 240,000 .

When considering the unit contribution required to meet the expected expenditure, the Finance Committee had to take into account the statement made by the United Kingdom Committee that, should an increase in contributions of the order now envisaged occur, it would be obliged to move to a Category lower than 6. The United Kingdom further invited the URSI Council to consider the creation of a category intermediate between the present Categories 5 and 6 in view of the wide gap between the contributions payable in these two categories. If such a category were created it is understood that the United Kingdom Committee would prefer to move into this category rather than into Category 5. In the interests of keeping the increase in the unit contribution to a minimum, the Finance Committee therefore recommends the creation of a new intermediate category. If this is accepted the categories and associated units payable would be :

Category	1	2	3	4	5	5A	6
Units Payable	1	2	4	8	16	24	32

Again, if the change is made, it is suggested that the number of votes attributable to each category should be :

Category	1	2	3	4	5	5A	6
Votes	2	4	6	8	10	11	12

Assuming the creation of the intermediate Category 5A, and that only the United Kingdom moves into it, the average unit annual contribution required to meet an expenditure of $ 240,000 would be $ 383. The Finance Committee recommends, however, that instead of a uniform annual contribution, the unit should be $ 320, $ 380 and $ 450 respectively in the years 1976, 1977 and 1978 (Table II).

Finally, the Finance Committee recommends that the Board should not only examine the accounts annually, but that it should also make them available at the same time to Member Committees. The Finance Committee also feels that the Council may wish to empower the Board to consult Member Committees by correspondence, if it should be considered necessary to vary the annual contribution for any year in the light of changing financial circumstances.

The Finance Committee :

J. A. Saxton *(Chairman)*
W. Becker
A. P. Mitra
J. E. Titheridge

Assisted by :

J. Voge *(Treasurer)*
C. M. Minnis *(Secretary General)*

Lima, 13 August 1975.

TABLE I. *Expenditure Budget : 1 January 1976-31 December 1978.*

($ 1 = 37.5 B. Fr.)

	$ (000)	$ (000)
1. *Annual Scientific Activities*		
1.1. Warsaw budget, 1972 (1)		105.6
1.2. less grants to symposia	−9.2	
1.3. less travel to Coord. Ctte	−15.2	
1.4. Total savings		−24.4
1.5. Total : Scientific activities		+81.2
2. *General Assemblies*		
2.1. XIX Assembly 1978 (100 %)	47.0	
2.2. XX Assembly 1981 (33 %)	19.5	
	66.5	
2.3. less travel expenses of 1 Officer in 8 Commissions	−17.8	
2.4. Total : General Assemblies		+48.7
2.5. Total : All Scientific Activities		129.9
3. *Administration*		
3.1. Present Sec. Gen. retained half-time until Dec. 1978. Brussels Secretariat maintained	156.7	
3.2. less savings if present Sec. Gen. retained half-time until March 1977	−10.5	
3.3. Total : Administration		146.2
4. *Scientific Activities and Administration*		
4.1. Total : Scient. Act. plus Admin.		276.1
4.2. less ICSU/UNESCO grants	−24.0	
4.3. less interest on investments	−12.0	
		−36.0
4.4. Net expenditure		$ (000) 240.1

(1) This amount is based on the amount allocated, by the Council in Warsaw, for the year 1974 adjusted for the devaluation of the dollar between 1972 and 1974 and for a 15 % per annum increase in costs from 1974 to 1978.

TABLE II. *Annual Contribution Payable by Member Committees assuming 8 Commissions* (US $).

Year	Category						
	1	2	3	4	5	5A	6
1976	$ 320	640	1,280	2,560	5,120	7,680	10,240
1977	$ 380	760	1,520	3,040	6,080	9,120	12,160
1978	$ 450	900	1,800	3,600	7,200	10,800	14,400

Additional Contribution Payable if Council agrees to the Formation of 9 Commissions (US $).

Year	Category						
	1	2	3	4	5	5A	6
1976	$ 10	20	40	80	160	240	320
1977	$ 10	20	40	80	160	240	320
1978	$ 15	30	60	120	240	260	480

SUPPLEMENTARY REPORT ON INCOME AND EXPENDITURE BUDGET FOR THE YEARS 1976-1978

1. — INTRODUCTION.

The scales of contributions and the budget given in Tables 1 and 2 of this Report replace those recommended in the Report of the Finance Committee dated 13 August 1975. The new Tables are based on the decisions and recommendations (summarised below) of the URSI Council at its meetings in Lima on 14 and 18 August.

2. — INCOME.

The URSI Council decided that the annual contributions payable by Member Committees of the Union should be as shown in Table 1.

TABLE 1. *Annual Contributions* (US $).

Year	Membership Category						
	1	2	3	4	5	5A	6
1976	$ 300	600	1,200	2,400	4,800	7,200	9,600
1977	$ 350	700	1,400	2,800	5,600	8,400	11,200
1978	$ 400	800	1,600	3,200	6,400	9,600	12,800

The 35 Member Committees (including Bulgaria) are expected to contribute a total of 216 units per year. It is assumed that ICSU will maintain the grant paid to URSI out of UNESCO funds at $ 8,000 per year.

3. — EXPENDITURE.

3.1. — *Annual Scientific Activities.*

As indicated in the Report of the Finance Committee, future expenditure on annual scientific activities has been based on the allocation, for the year 1974, approved by the Council in 1972 but adjusted to take account of the subsequent devaluation of the US dollar. However, the amount allocated has been reduced by making a reduction in the future expenditure on symposia from $ 4,000/year to $ 2,000/year (1974 values), and by making no provision for the Coordinating Committee meeting in 1977 (estimated cost of $ 15,000).

Although the Council agreed to the formation of nine Commissions, instead of eight as recommended by the Board of Officers, it was decided that no additional funds could be made available for annual scientific activities, and that the Board of Officers should make appropriate reductions in the allocations of funds to the Commissions.

3.2. — *XIX and XX General Assemblies.*

The allocations of funds for the General Assemblies in 1978 and 1981 have been reduced following the decision of the Council that URSI should pay the travel and related expenses of only the President of the Union, the Secretary General and the Administrative Secretary. However, it was agreed to establish an emergency fund which will be used in cases where the delegation to which a member of the Board of Officers or a Chairman of a Commission belongs is unable to cover the officer's expenses in full.

3.3. — *Administration.*

The cost of administration is based on the maintenance of the present URSI Secretariat in Brussels but with the Secretary General working only half-time after the end of 1975.

It is assumed that the annual dues payable to ICSU will remain at the present level, namely 2.5 % of the income received from the contributions of Member Committees.

4. — Balance of Income and Expenditure.

It is estimated that expenditure will exceed income during the three-year period 1976-78 by $ 4,500 and that a credit balance of $ 12,000 will be carried forward at the end of 1975. This balance will provide working capital pending the receipt of Members' contributions in 1976, but its value will fall to about $ 7,500 by 31 December 1978.

Table 2. *URSI Income and Expenditure Budget 1 January 1976-31 December 1978* ($ 1 = 38.0 Belgian francs).

$ (000)

	1976	1977	1978	Total
Income :				
Member Committees (216 units/year) .	64.8	75.6	86.4	226.8
ICSU/UNESCO Grants	8.0	8.0	8.0	24.0
Interest on Investments	3.4	3.9	4.5	11.8
$ (000)	76.2	87.5	98.9	262.6
Expenditure :				
Annual Scientific Activities	23.1	26.6	30.5	80.2
General Assemblies				
1978	8.7	10.1	—	18.8
1981	—	—	7.8	7.8
Administration	44.5	51.2	58.9	154.6
ICSU Dues	1.6	1.9	2.2	5.7
	77.9	89.8	99,4	267.1
Income — Expenditure	−1.7	−2,3	−0.5	−4.5
$ (000)	76.2	87.5	98.9	262.6

Lima, 19 August 1975.

J. A. Saxton, *Chairman, Finance Committee*
J. Voge, *Treasurer*
C. M. Minnis, *Secretary General*

URSI Accounts for the Years 1972, 1973 and 1974

The Finance Committee examined the Accounts of Income and Expenditure, including the Balance Sheets, for the calendar years 1972, 1973 and 1974 and, in its Report to the Council (see page 58), recommended their publication in the *Proceedings*.

The amounts shown in the accounts reproduced below have been taken from the original accounts (in Belgian francs and US dollars) audited by Gimson & Co., Chartered Accountants, London. The amounts are given here in US dollars converted at the ICSU/UNESCO rate of exchange for the Belgian franc at 31 December each year :

Value of US$ 1 on 31 December

Date	Belgian francs
1972	44.—
1973	39.50
1974	37.50

The decrease in the value of the dollar between 1 January and 31 December in a given year gives rise to an increase in the amount of the Balance carried forward when it is expressed in dollars. This increase is shown as "Gain on Conversion of Belgian francs to dollars".

INTERNATIONAL UNION OF RADIO SCIENCE

Income and Expenditure Accounts
for the years ended 31 December 1972, 1973, 1974

Year ended 31 December 1972

	$	$	$
INCOME			
Subscriptions			40,517
Interest (*less* tax : $ 1,065)		4,998	
Profit on sale of investment		40	
		5,038	
less interest attributable to Pension and Balth. van der Pol Gold Medal Funds		406	
			4,632
Sale of publications			971
Allocation from UNESCO grant to ICSU			12,375
TOTAL INCOME			$ 58,495
EXPENDITURE			
Scientific Activities			
XVII General Assembly			
Travel	13,133		
Review of Radio Science	5,580		
Proceedings Vol. XVI	1,568		
Young Scientists Scheme	10,870		
Miscellaneous	1,267		
		32,418	
Meetings			
Board of Officers	2,005		
Reorganisation Group	270		
		2,275	
Representation of URSI			
COSPAR		451	
Symposia			
Planetary Atmospheres	1,440		
Small Electron Densities	1,000		
Satellite Beacons	400		
Precision EM Measurements	200		
GEOS Observations	138		
		3,178	
Publications			
URSI Bulletin Nos 182-184	2,898		
INAG Bulletin	600		
		3,498	
Grants			
IUCAF	1,000		
IUCRM	150		
IUCRM Symposium	1,500		
IUC Moon	300		
Committee on Science Teaching	200		
FAGS	1,000		
		4,150	
TOTAL : SCIENTIFIC ACTIVITIES *(carried forward)*			45,970

	$	$	$
(brought forward)			45,970
Administration			
Salaries (including social security and supplementary pension provisions)		27,277	
Office and General Expenses			
Office rent, heat, repairs, etc.	2,916		
Stationery and office supplies	314		
Insurance	433		
Telephone	247		
Postage	455		
Bank charges	98		
Entertainment	183		
Audit and accountancy	750		
Miscellaneous	36		
		5,432	
TOTAL : ADMINISTRATION			32,709
ICSU dues (*less* refund for 1970 : $ 736)			277
Loss on devaluation of the dollar			209
TOTAL EXPENDITURE			79,165
Excess of expenditure over income for the year			20,670
			$ 58,495

	$
Balance in hand on 1 January 1972	105,512
Excess of expenditure over income in 1972	20,670
Balance in hand on 31 December 1972	$ 84,842

Year ended 31 December 1973

	$	$	$
INCOME			
Subscriptions from Member Committees			46,975
Interest (*less* tax : $ 1,074)		5,118	
Profit on redemption of investment		10	
		5,128	
less interest attribuable to Pension and Balth. van der Pol Gold Medal Funds		546	
			4,582
Sale of publications			712
Allocation from UNESCO grant to ICSU			11,375
Registration fees : Symposium on Incoherent Scatter			612
TOTAL INCOME			$ 64,256
EXPENDITURE			
Scientific Activities			
Meetings			
XVII General Assembly	731		
Board of Officers	3,461		
Representatives of Commissions	2,626		
Miscellaneous	329		
		7,147	
Symposia			
Incoherent scatter	489		
Lower ionosphere	343		
Remote sensing	437		
		1,269	
Representation of URSI			
FAGS Council	242		
COSPAR	658		
CPEM	201		
Miscellaneous	248		
		1,349	
Publications			
URSI Bulletin Nos 185-189	3,816		
INAG Bulletin	650		
		4,466	
Grants			
IUCAF	1,000		
IUCRM	150		
IUCRM Symposium	1,400		
IUC Moon	300		
		2,850	
TOTAL : SCIENTIFIC ACTIVITIES *(carried forward)*			17,081

	$	$	$
(brought forward)			17,081
Administration			
Salaries (including social security and supplementary pension provisions)		33,836	
Office and General Expenses			
Office rent, heat, repairs, etc.	3,998		
Stationery and office supplies	693		
Insurance	551		
Telephone	425		
Postage	541		
Bank charges	91		
Entertainment	319		
Audit and accountancy	835		
do (special fee for extra work on the devaluation of the dollar)	418		
Miscellaneous	37		
		7,908	
TOTAL : ADMINISTRATION			41,744
ICSU dues for 1973			1,174
Loss on devaluation of the dollar			428
TOTAL EXPENDITURE			60,427
Excess of income over expenditure for the year			3,829
			$ 64,256

	$
Balance in hand on 1 January 1973	84,842
Gain on conversion of Belgian francs to $	9,666
	94,508
Excess of income over expenditure in 1973	3,829
Balance in hand on 31 December 1973	$ 98,337

Year ended 31 December 1974

	$	$	$
INCOME			
Subscriptions from Member Committees			
Annual		43,040	
Special contributions		5,441	
			48,481
Interest (*less* tax : $ 1,636)		7,700	
less loss on sale of investment		2,807	
		4,893	
less interest attributable to Pension and Balth. van der Pol Gold Medal Funds		223	
			4,670
Sale of publications			385
Allocation from UNESCO grant to ICSU			11,375
Profit on exchange			132
TOTAL INCOME			$ 65,043
EXPENDITURE			
Scientific Activities			
Meetings			
Board of Officers	8,022		
Representatives of Commissions	8,465		
XVIII General Assembly	429		
		16,916	
Representation of URSI			
COSPAR	1,662		
CPEM	107		
		1,769	
Symposia			
Solar-Terrestrial Physics	1,588		
Microwaves	272		
Electromagnetic Theory	512		
Scattering and emission	1,134		
Incoherent scatter	507		
		4,013	
Grants			
IUCAF	1,000		
IUCRM	150		
Ionospheric Trainee (Zaïre)	313		
		1,463	
Publications			
URSI Bulletin Nos 190-192 and Index	2,688		
INAG Bulletin	650		
Handbook : translation	205		
		3,543	
TOTAL : SCIENTIFIC ACTIVITIES *(carried forward)*			27,704

	$	$	$
(brought forward)			27,704
Administration			
Salaries (including social security and supplementary pension provisions)		38,650	
Office and General Expenses			
Office rent, heat, repairs, etc.	4,467		
Stationery and office supplies	552		
Insurance	617		
Telephone	360		
Postage	508		
Bank charges	128		
Entertainment	278		
Audit and accountancy	1,020		
Miscellaneous	52		
		7,982	
TOTAL : ADMINISTRATION			46,632
ICSU dues for 1974			1,076
			75,412
Excess of expenditure over income for the year			10,369
			$ 65,043

	$
Balance in hand on 1 January 1974	98,337
Gain on conversion of Belgian francs to dollars	5,244
	103,581
Less excess of expenditure over income in 1974	10,369
Balance in hand on 31 December 1974	$ 93,212

Balance Sheet

	31 Dec. 1972 $		31 Dec. 1973 $		31 Dec. 1974 $	
ASSETS						
Bank balances						
Belgian francs	66,095		75,380		61,050	
American dollars	714		811		1,367	
		66,809		76,191		62,417
Belgian Government Securities		37,694		49,520		64,007
Petty cash and stamps		63		127		107
Sundry debtors		7,081		938		1,332
		111,647		126,776		127,863
Less :						
Creditors	18,492		17,620		21,657	
Balth. van der Pol Fund	3,126		3,676		3,944	
Pension Fund	5,187		7,143		9,050	
		26,805		28,439		34,651
TOTAL : URSI Funds		$ 84,842		$ 98,337		$ 93,212

The distribution of the funds listed above was as shown below :

	31 Dec. 1972 $		31 Dec. 1973 $		31 Dec. 1974 $	
Reserve Fund						
General	35,000		35,089		4,000	
Closure of Secretariat	12,000		13,367		30,800	
		47,000		48,456		34,800
Funds for Scientific Activities						
XVIII General Assembly	11,000		23,392		40,000	
Other meetings and symposia in 1973, 1974 and 1975	18,800		21,833		18,000	
Special Needs Fund	6,000		4,456		0	
		35,800		49,681		58,000
Unallocated		2,042		200		412
TOTAL : URSI Balances		$ 84,842		$ 98,337		$ 93,212

Report of Publications Committee

Membership : Prof. K. Géher, Prof. S. Hahn, M. M. Thué (Chairman).

Also attended : Prof. W. J. G. Beynon, Prof. S. A. Bowhill, Dr. C. M. Minnis, Mme Y. Stevanovitch.

1. — URSI Information Bulletin

It is recommended to continue the publication of the *Bulletin* with similar contents, for example :

— information from the President and the Board of Officers;
— information on scientific activities of Commissions, including symposia organised or sponsored by Commissions;
— information about other Unions (or other bodies) of interest to URSI.

This information should be as concise as possible.

An offset method of printing is suggested, in order to save time and money, but it is asked that good-quality paper be used to ensure conservation during a long period.

The 3-month periodicity should be maintained with the best possible regularity.

2. — Proceedings of URSI General Assemblies

It is recommended to continue the publication of the *Proceedings* in the same form, with contents similar to those in Vol. XVI (1972).

3. — Abstract Booklets

It is recommended that a booklet of abstracts be issued for each open Symposium held during the General Assembly, under the responsibility of the Symposium Programme Committee, possibly with some financial support from URSI. Directives must be issued by the URSI Secretariat to ensure a sufficient uniformity in the format and presentation of the booklets.

At the end of each Symposium, a copy of each booklet, indicating the papers actually presented, should be given to the Secretariat.

The Committee wishes to express its appreciation of the effort made by those who prepared the Abstract Booklets for the Assembly : namely Dr. Giesecke (Scientific Sessions of the Commissions) and Prof. Bowhill, Dr. Gendrin and Mr. Hagn (Symposia A, B and C).

4. — Review of Radio Science

Although certain delegates approached by the members of the Committee were of the opinion that the amount of effort was too great in relation to the desired result, many others considered that the result was very valuable and that the publication should be continued.

The *Review* is not directed towards specialists, but is intended for :

— scientists in other domains,

— people concerned with teaching,

— managers of research laboratories and governmental institutions,

— managers of industrial firms,

— people in developing countries.

It is also felt that the *Review* provides evidence of URSI scientific activity during the period covered.

It is proposed to prepare, for the next General Assembly, a *Review* established on the same lines as the 1975 volume : namely one General Editor appointed by the URSI Council to cooperate with scientific editors appointed by each Commission; basic information to be sent by National Committees to scientific editors; the review to be prepared from this material under the responsibility of the scientific editors with the help of several people in each Commission.

Two possibilities are proposed for the publication schedule :

(*a*) collection of information from the National Committees before the end of 1977; publication in July 1978;

(*b*) collection of information in August 1978, at the time of the General Assembly, with updating during the Assembly and publication as soon as possible (say early 1979).

The Committee considers that Prof. Bowhill carried out successfully the responsibility of editing the *Review* for 1972-74, from both the scientific and organisational points of view, and recommends that he should be appointed as General Editor for the next *Review*.

It is recommended that URSI, with the help of National Committees and of the ITU, should make a great effort for a wide distribution of the *Review* to all interested bodies. This Recommendation applies first to the presently available *Review* for the period 1972-74.

Comments already received from Commissions III, IV and V indicate that the *Review* is considered worthwhile and useful and that wide circulation is desirable.

5. — URSI Journal

Prof. Bowhill made the proposal that URSI should sponsor the publication of an international journal, which could be named "Radio Science and Telecommunication" and in which URSI symposia papers, as well as contributed papers, could be published. If this were decided, the URSI Committee in the USA would probably discontinue the publication of *Radio Science* and submit the corresponding material to the URSI journal. The Editorial Committee would include one representative from each Commission, and the Secretary General of URSI.

The Committee considered that this proposal should be further studied and, in particular, the possibility of finding a publisher willing to operate at no cost to URSI and making no page-charge for the authors. Support from the ITU could perhaps be obtained.

6. — URSI Brochure

Following a suggestion by M. Voge, the URSI Secretariat has prepared the draft text of a small brochure for wide dissemination among scientists, students, engineers and others. This brochure should contain information concerning the *Review of Radio Science.*

7. — INAG Bulletin

It is noted that publication of the *INAG Bulletin* is the responsibility of WDC-A but, in accordance with the opinion of Commission III, it is recommended that URSI should keep control of the scientific content of the *Bulletin* and give some financial support.

8. — Other Publications

It is agreed that occasional limited support should be given by URSI, when needed, towards the publication of certain instruction manuals.

12 August 1975.

Report on the Work of the Drafting Committee

The Drafting Committee was established by the URSI Council in Lima with the following membership :

Members of Council :	*URSI Secretariat* :
Dr. J. A. Saxton,	Dr. C. M. Minnis,
M. M. Thué	Mme Y. Stevanovitch.

The Council agreed that it would probably not be possible for the Committee to complete its work before the end of the Assembly and that it would be necessary to prepare the final texts after the Assembly.

The Drafting Committee met in Paris on 10 October 1975 and agreed on the French and English texts of the Resolutions adopted in Lima. These texts were published in *URSI Information Bulletin* No. 195 (September 1975). It should be noted that, in some cases, the minutes of meetings recorded decisions or recommendations, but time did not permit the preparation of a formal text for submission to the Drafting Committee. Such decisions and recommendations were later incorporated in texts of the appropriate form and approved by the Drafting Committee.

Resolution C. 1 of the Council refers to certain modifications of the URSI Statutes. The necessary revisions are at present being studied and will be submitted to Member Committees for comment or approval during 1976.

16 February 1976.

C. M. Minnis,
Secretary General.

BUSINESS TRANSACTED BY COMMISSIONS

The following summary of the activities of the URSI Commissions during the General Assembly has been prepared by the Secretary General using various documents submitted by the officers of the Commissions or by those who acted as reporters.

Commission I. — Radio Measurements and Standards

Chairman : Mr. P. O. Lundbom (Sweden).

Vice-Chairman : Dr. H. M. Altschuler (USA).

Reorganisation of URSI

Mr. Lundbom referred to the articles, prepared by Dr. Altschuler and himself, in the *URSI Bulletin (Nos 189 and 190)* which reviewed the past history of Commission I and included suggestions concerning the future activities of the Commission. He hoped that in future there would be greater participation by industrial research scientists and by younger workers.

Dr. Altschuler noted that URSI would be increasingly concerned with telecommunications science and that it would be desirable for the new Commission to develop contacts with people in the various national organisations which could be regarded as the primary sources of research related to telecommunications.

There was support for the concept of open meetings at future Assemblies provided that proper consideration is given to the associated organisational questions. However, there was also a need for more joint meetings with other Commissions in order to stress the importance of measurements in general.

A suggestion was made that papers on automated measurements should not be concentrated in one session but should be distributed among the sessions dealing with the relevant type of measurement.

National Standards Laboratories

The Chairman of the Working Group (Mr. A. E. Bailey) presented a draft report, dated July 1975, containing information on national standards laboratories. He had invited the 24 contributing bodies to edit and correct the contents. He hoped it would be possible to add contributions from 12 other countries which had not yet replied to his request for information.

It was agreed to invite Mr. Bailey to continue with the compilation and that the first edition should be issued in 1976. It was suggested that the Report, when available, should be publicised and sold. Further consideration should be given to the type of printing and the format, including the possibility of a loose-leaf report.

CPEM 1975

Mr. Lundbom summarised the resolutions adopted in London by CPEM. These included further support for BIPM, CIPM and BIH in their work relating to time and frequency standards, and recommendations concerning other topics of interest to Commission I.

Review of Radio Science 1972-1974

Several criticisms were made of the current issue of the *Review*. It was noted that URSI had not formally given directives as to the content of the *Review* and there was no consensus of opinion concerning the ultimate readership : a large audience having a broad technical background, or a small specialist audience. It is suggested (*a*) that the number of references quoted in the *Review* be considerably reduced; (*b*) that more attention should be given to the selection of significant highlights for inclusion in the *Review*; (*c*) that the *Review* should be advertised and made available for sale outside the URSI General Assembly.

Title of Commission A

It was agreed by a large majority that the most appropriate short title for the new Commission A would be "Electromagnetic Metrology".

Text of Resolutions

A suggestion was made that draft resolutions should be circulated well before the Assembly and examined at the first Business Meeting of the Commission. Drafts generated spontaneously during the Assembly should be considered only at later Business Meetings.

Future Programme

Dr. Altschuler reviewed plans for the next three years and drew attention particularly to new topics such as measurements relating to communications and to biological effects of electromagnetic radiation.

Election of Vice-Chairman

The Commission voted in favour of Dr. S. Okamura (Japan) as Vice-Chairman of Commission A for the period 1975-1978. The election of Dr. Okamura was subsequently confirmed by the URSI Council.

Papers presented during Scientific Sessions

Session on Quantum frequency standards, including optical standards (see Commission VII).

Session on Standard time and frequency transmission.

— Progress in the realisation of time scales, G. Becker.
— Methods of describing the fluctuations of time and frequency standards, J. Rutman and J. Uebersfeld.
— LF and VLF time and frequency transmissions, J. McA. Steele.
— The transmission of time and frequency by satellites, H. Hellwig.
— Various methods for the dissemination of time and frequency, C. Egidi.

Session on Laser measurements (organised jointly with Commission VII).

— Laser power and energy measurements for hazard control, H. Boyne.
— Measurements on pulsed lasers, J. Edwards.

— The extension of radio technology to 148 THz, K. M. Evenson.
— Le Comité consultatif pour la définition du mètre et la vitesse de la lumière, P. Giacomo.
— Recent progress in laser measurements in Japan, K. Sakurai.

SESSION ON MEASUREMENTS AT RADIO FREQUENCIES AND AT MM AND SUB-MM WAVELENGTHS.

— Accurate antenna measurements at reduced distances, R. C. Baird.
— Measurements at radio frequencies and at mm and sub-mm wavelengths. Recent developments in microwave detectors, S. Okamura.
— A wide-band phase meter, G. Tisnado.
— Standards of millimetre and sub-millimetre wavelength, C. R. Ditchfield, J. McA. Steele and A. E. Bailey.
— Mesure des propriétés électromagnétiques de la matière (susceptibilité magnétique) à très bas niveau d'excitation, J. Uebersfeld.

SESSION ON AUTOMATED AND COMPUTERIZED MEASUREMENT.

— Recent developments in the USA on computer-controlled automatic measurement systems, R. W. Beatty.
— Recent progress in automated and computerized measurements in Japan, H. Kaji.
— Increasing use of automated measurement in West Germany, H. Groll.
— The trend toward automation in testing and measurement, R. F. Clark and A. Jurkus.
— Automation of RF instrumentation in the UK, C. R. Ditchfield.
— Automatic plotting of the frequency stability figure of a frequency generator, J. Uebersfeld.

SESSION ON INTERACTION OF RADIO FREQUENCY FIELDS WITH BIOSYSTEMS AND REPORT FROM WORKING GROUP I.2.

— Overview of standards and safe human exposure limits in various countries, P. Czerski.
— Suggestions for future URSI engagement in the field of radiobiology, H. M. Altschuler.

— Some problems relating to the possible effects of non-ionizing electromagnetic radiation on man, P. Weissglas.

— Discussion on standards, and results of a recent experiment, Rosenthal.

SESSION ON INTERNATIONAL COMPARISON OF STANDARDS.

— Progress review, S. Okamura.

— International comparison of laser power, R. Ishige.

— Progress report on international comparison of power standards in WR-28 waveguide, R. F. Clark.

— International comparisons piloted by the National Physical Laboratory in the UK, J. McA. Steele and C. R. Ditchfield.

— International comparisons piloted by the National Bureau of Standards (USA), H. M. Altschuler.

SESSION ON JOSEPHSON JUNCTION AS AN ELEMENT IN ELECTRONIC MEASUREMENT SYSTEMS (organised jointly with Commission VII).

— Progress review of Josephson effect in dc measurements, V. Kose.

— Josephson tunnelling devices for computer applications, W. Anacker.

— The Josephson junction as an element of hf electromagnetic measurement systems, R. A. Kamper.

— Cryogenic ac Josephson-effect emf standard using a superconducting current comparator, I. K. Harvey.

Commission II. — Radio and Non-ionized Media

Chairman : M. P. Misme (France).

Vice-Chairman : Mr. F. Eklund (Sweden).

INTER-UNION COMMISSION ON RADIOMETEOROLOGY (IUCRM)

Commission II discussed the future programme of activities of IUCRM and, in particular, the proposal to include radio-oceanography in its terms of reference.

Consideration was also given to the membership of IUCRM and the designation of the URSI representatives.

The recommendations made by Commission II were submitted to the URSI Council and appear as Resolutions C. 11, C. 12, C. 13 and C. 14.

Commission II Symposium

It was agreed to recommend the organisation of a Symposium dealing with (*a*) remote sensing and (*b*) the limitations imposed on telecommunications systems by propagation effects. It is hoped to hold this Symposium in France in 1977 (See Res. II.1).

Inter-Union Commission on Frequency Allocations for Radio Astronomy and Space Science (IUCAF)

Commission II expressed its support for the encouragement given to IUCAF by the URSI Council (Res. C. 10).

Election of Vice-Chairman

The Commission elected Prof. A. T. Waterman, Jr. (USA) as Vice-Chairman of Commission F for the period 1975-1978 and this election was confirmed by the URSI Council.

Papers presented during Scientific Sessions

Session on Remote sensing.

— Review of microwave remote sensing, R. K. Moore.
— Passive microwave sensing, especially of soil moisture, J. W. Rouse, Jr.
— A multisensor multination experiment on sensing ice in the Gulf of Bothnia, M. Tiuri.
— Probing continental ice sheets by radar, P. Gudmandsen.

SESSION ON THEORY AND RESULTS OF STUDIES OF THE LOWER ATMOSPHERE BY ACOUSTIC METHODS.

— A review of the atmospheric acoustic sounding : theory and results, M. Aubry.

— Progress in atmospheric acoustics at the Wave Propagation Laboratory, C. G. Little and F. F. Hall.

— Swedish sodar investigations and results, H. Ottersten.

— Status of solar observations in Japan, M. Fukushima.

SESSION ON MEASUREMENTS OF ATTENUATION DUE TO RAIN AND OTHER HYDROMETEORS.

— Survey, P. A. Watson.

— Attenuation by rainfall measured in the Federal Republic of Germany at 12, 15 and 29 GHz, N. Abel.

— Comparison between attenuation at 13 and 20 GHz on the same link giving an assessment of the Laws-Parsons law, M. Boithias.

— Radiometric measurements of slant path attenuation at several Canadian locations, J. I. Strickland.

— The ATS-6 Comsat 13/18 GHz propagation experiment, G. Hyde.

SESSION ON THE DEVELOPMENT OF MODELS OF THE ATMOSPHERE APPLICABLE TO ABSORPTION DUE TO RAIN.

— Models : their theoretical and physical foundations, R. R. Rogers.

— Déterminations pratiques de l'absorption par la pluie pour les liaisons terrestres et spatiales, I. Revah.

— Practical models for engineering applications, G. Drufuca.

— Radar and optical determination of rainfall characteristics, E. E. Gossard and R. S. Lawrence.

SESSION ON THE THEORY AND EXPERIMENTAL RESULTS RELATING TO DEPOLARISATION DUE TO RAIN.

— Rain depolarisation studies at centimetre and millimetre wavelengths : Theory and measurement, T. Oguchi.

— Cross-polarisation measurements at 11, 20 and 36 GHz in the UK, B. G. Evans, D. J. W. Turner and P. A. Watson.

— Results from the ATS-6 20 GHz depolarization experiment, W. L. Stutzman, C. W. Bostian, E. A. Manus, P. H. Wiley and R. E. Marshall.
— Polarization related parameters for scattering and propagation in precipitation, G. C. McCormick and A. Hendry.
— Theory and experimental study of microwave depolarization due to rain, P. Delogne, P. Osvath, P. Sobieski and J. Van Vyve.
— Measurements of differential attenuation on a 50 km path at 13 GHz, L. Boithias.

SESSION ON NEW TOPICS.

— General survey of important topics, F. Eklund.
— Ground wave and subsurface propagation, J. R. Wait.
— The Inter-Union Commission on Radio Meteorology, B. R. Bean.
— Electromagnetic wave propagation and telecommunications systems, L. Boithias.
— Remote sensing of the surface of the Earth, R. K. Moore.

Commission III on the Ionosphere

Chairman : Prof. S. A. Bowhill (USA).

Vice-Chairman : Dr. J. W. King (UK).

INAG BULLETIN

It was agreed to recommend that URSI should continue to provide partial financial support for the issue of the *INAG Bulletin* and its distribution from WDC-A at Boulder.

INFORMAL POLLS

As a result of several informal polls the following conclusions were reached :

1. that the considerable effort involved in the preparation of the *Review of Radio Science* at intervals of three years is justified;

2. that open symposia should form part of the scientific programme of future URSI General Assemblies;
3. that some sessions of symposia should conclude with a discussion of the subject by a panel of experts;
4. that the Working Group on Radio experiments on ionosphere-magnetosphere interactions should not be reconstituted.

Recommendations

Following discussions in the Commission, Resolutions III.1-III.11 were adopted (see p. 141).

Election of Vice-Chairman

A vote showed that the preferred candidate for Vice-Chairman of the new Commission G was Dr. A. P. Mitra (India) whose election was later confirmed by the URSI Council.

Scientific Sessions

Commission III cooperated in the organisation of the Open Symposia in Lima and no separate scientific sessions were arranged.

Commission IV on the Magnetosphere

Chairman : Dr. F. L. Scarf (USA).

Vice-Chairman : Dr. R. Gendrin (France).

Working Groups and Symposia

Discussions on the future activities of Commission IV resulted in the adoption of Resolutions IV.1-IV.5 (see p. 148).

Election of Vice-Chairman

The URSI Council elected Dr. F. W. Crawford as Vice-Chairman of Commission H following a recommendation made by Commission IV.

Scientific Sessions

Commission IV cooperated in the organisation of the open symposia in Lima. No separate scientific sessions were arranged apart from the joint sessions with Commission VIII.

Papers presented during Scientific Sessions

The following sessions deal with subjects of interest to Commissions IV and VIII and were arranged jointly.

Working Group on whistlers in the magnetosphere.

— Theory of propagation of whistlers in the ionosphere, A. D. M. Walker.
— A survey of ground-based whistler observational programmes : their results and prospects, M. J. Rycroft.
— Report of activities of URSI Working Group on whistlers in the magnetosphere, D. L. Carpenter.

Session on Active magnetospheric experiments involving radio and plasma waves.

— Active VLF experiments in the magnetosphere, D. L. Carpenter.
— Artificial electron beam in the magnetosphere, R. Gendrin.
— Some active experiments for the AMPS/SHUTTLE payloads, R. W. Fredricks.

Session on Whistler detection and analysis.

— The location in time of atmospherics causing whistlers from whistler traces, G. J. Daniell.
— The automatic detection and analysis of whistler signals, D. Jones.

Commission V on Radio Astronomy

Chairman : Dr. J. L. Locke (Canada).

Vice-Chairman : Prof. G. Westerhout (USA).

Inter-Union Commission on Frequency Allocations for Radio Astronomy and Space Science (IUCAF)

In view of the importance of the activities of IUCAF in making its preparations for the World Administrative Radio Conference in 1979, Commission V unanimously supported the resolution submitted to the URSI Council and subsequently adopted as Res. C. 10.

The Commission also wished to place on record its appreciation of the services of the Secretary General of URSI during his term of office as Secretary of IUCAF (1972-1975).

Review of Radio Science

The views on the publication of the *Review* were generally favourable, but it was recommended that the volume should be publicised and made available outside the URSI General Assembly.

Resolutions

Discussions on other subjects resulted in the adoption of Resolutions V.1-V.3 (see p. 150).

Election of Vice-Chairman

Following a recommendation made by the Commission, Dr. H. Tanaka (Japan) was elected as Vice-Chairman of Commission J for the period 1975-1978.

Papers presented during Scientific Sessions

Session on Solar system radio and radar astronomy.

— Solar radio observations at mm and cm wavelengths, M. R. Kundu.
— Culgoora results at meter wavelengths, K. V. Sheridan.
— A model for solar oscillations, W. L. H. Shuter.
— 35 GHz observations with the Bordeaux interferometer, J. Delannoy.
— Spectra of microwave bursts, J. Aarons.
— Burst detectability, P. Kaufmann.
— Circular polarization of Jupiter at 21 cm, F. Ribes.
— Superstars, QSO's and the black-hole myth, D. H. Menzel.

Sesssion on Spectral line observations and techniques.

— Review paper, B. J. Robinson.
— Front ends for mm waves, S. Weinreb.
— H_2O masers, P. Kaufmann.
— High velocity H_2O, B. J. Robinson.
— H_2O scattering, V. Radhakrishnan.
— CS in dark clouds and NH_3 in Orion, A. H. Barrett.
— CO in Ophiuchus $(^{17}O)/(^{18}O)$, F. Biraud.
— CS, CO survey, M. Morimoto.
— Westerbork HI observations, E. Ekers.
— HI in elliptical galaxies, H. J. Wendker.

Session on High-resolution mapping.

— Techniques and problems, G. Pooley.
— Interpretation of synthesis maps, R. Ekers.
— Graceful antenna arrays, F. Biraud.
— Some southern radio galaxies, W. N. Christiansen.
— The structure of the central component of 3C236, E. B. Folamont.
— Intercontinental synthesis, K. Kellermann.
— Small spacing terms in synthesis maps, K. I. Wielebinski.

SESSION ON ACCURATE POSITION MEASUREMENTS.

— Review of techniques, results, limitations : present and future, C. C. Counselman.
— Results from the 5-km telescope, G. Pooley.
— Atmospheric fluctuations and instrumental errors, P. J. Hamacker.
— Gravitational bending of radio waves, E. B. Folamont.

SESSION ON UNRESOLVED CONTINUUM SOURCES.

— Radio stars, W. J. Altenhoff.
— Radio source counts, I. Pauliny-Toth.
— Lunar occultation observations of 400 radio sources, G. Swarup.
— Angular diameter redshift relation, R. Ekers.
— Long-term variability of radio sources at mm wavelengths, R. W. Hobbs.
— 18 cm flux variability observations, G. W. Swenson.
— Pulsars, R. Wielebinski.

SESSION ON NEW DEVELOPMENTS AT OBSERVATORIES AND LABORATORIES.

— Very long baseline interferometry using a communications satellite, G. W. Swenson.
— A streamlined Mark II VLBI terminal : The Mark II-C, G. W. Swenson.
— The European mm-wave project, R. Wielebinski.
— Millimetre-wave radio interferometer of a novel design, G. Swarup.
— Operation of Haystack at 43 GHz, A. H. Barrett.
— A small mm-wave dish in Australia, B. J. Robinson.
— Extension of the Fleurs synthesis telescope, W. N. Christiansen.
— Multichannel solar spectrometer at Nobeyama, M. Morimoto.
— New solar interferometers in Japan : 4.3, 17 and 35 GHz, M. Morimoto.
— New facilities for radio astronomy in the Netherlands, J. L. Casse.
— VLA Status report, S. Weinreb.
— A new 151 MHz telescope at Cambridge, G. Pooley.
— Molecular spectroscopy at mm-waves at Tokyo and Kizarazu, M. Morimoto.

— Development of an interferometer for solar observations at 3 mm, K. Sheridan.
— Converting the Culgoora radio-heliograph to operate at 4 frequencies, K. Sheridan.
— Broad-band polarimeter for solar radio bursts, K. Sheridan.
— The Clark Lake radio-heliograph, G. Westerhout.
— Mechanical and electrical performance of the Max Planck Institut 100-m telescope, B. H. Grahl.
— The development of a new technique for pre-detection anti-dispersion of pulsar signals, T. Cole.
— Polarimeter for linear and circular polarization measurements, R. Wielebinski.
— Developments at Algonquin Radio Observatory, Dominion Radio Astrophysical Observatory, and University of B. C., W. L. H. Shuter.

Commission VI on Radio Waves and Circuits

Acting Chairman : Prof. H. L. Knudsen (Denmark).

Vice-Chairman : Prof. F. L. Stumpers (Netherlands).

Following the death of Professor Siegel in March 1975, the Board of Officers invited the Vice-Chairman (Prof. H. L. Knudsen) to be Acting Chairman. Prof. Knudsen agreed and at the same time Prof. F. L. Stumpers (Associate Vice-Chairman for Information Theory) was recognised as Vice-Chairman of Commission VI.

At the first scientific session of Commission VI on 12 August, Prof. A. A. Ksienski gave a commemorative talk honouring the memory and the activities of Prof. Siegel.

Acting Chairman's Report

Programme for Meetings in Lima. — The Acting Chairman presented a Report on the activities of Commission VI since the 1972 Assembly. With regard to the organisation of the scientific sessions of Commission VI at

the present Assembly, he pointed out that in March 1974, invited speakers had already been selected with the approval of Prof. Siegel.

Prof. Stumpers was responsible for the sessions on information theory and the joint sessions with other Commissions, while he himself had arranged the programme for the sessions dealing with electromagnetic theory and related matters. Prof. Knudsen expressed his thanks to the individuals who had put so much work and ingenuity into the organisation of the sessions.

Review of Radio Science 1975. — Prof. Knudsen expressed his appreciation of the work done by Prof. Ksienski, in his capacity as editor of the section dealing with Commission VI, and to the sub-editors who had assisted him. It was unfortunate, however, that many Member Committees had not submitted material for inclusion in the *Review*.

Symposia. — Prof. Knudsen stressed the importance of the international symposia on various topics of interest to Commission VI which had been cosponsored by URSI since 1972 and reported in the *URSI Information Bulletin*, and expressed his thanks to those who had undertaken the task of organising them.

Reorganisation of URSI. — Prof. Knudsen referred to the statement made following the meeting in Brussels, in September 1973, by the representatives of URSI Commissions I, II, V, VI and VII (*URSI Inf. Bull.*, No. 189). The proposals submitted by the Board of Officers to the URSI Council were in general agreement with the views expressed in this statement.

General Discussion

At the request of the Acting Chairman, Prof. Stumpers *(Vice-Chairman)* took the chair at the Business Meetings of Commission VI.

Subdivision of Commission VI

It was noted that the Board of Officers had proposed the replacement of Commission VI by two new Commissions dealing respectively with electromagnetic theory and with communications. The Commission agreed with these proposals.

Scientific Sessions at future Assemblies

It was agreed that, in addition to open symposia relating to the field of Commission VI, there should also be scientific sessions for the presentation of papers by invited speakers. Some of these sessions should deal with topics of interest to other Commissions.

Review of Radio Science

Opinions were divided on the value of the *Review* but it was finally agreed to recommend its continued publication. It was proposed also (*a*) that the references should be classified in accordance with the titles of the subsections; (*b*) that the full titles of papers should be quoted in the references.

Symposia

The Commission recommended that URSI should consider the possibility of cosponsoring a number of symposia being planned for the period 1976-78 (Res. VI.1).

The Commission supported the proposal of the Acting Chairman that the invitation from the USA to hold a Symposium on EM Theory near San Francisco in 1977 be accepted.

Working Group on Wave Analysis

It was agreed to accept the invitation of Commission H to set up a joint Working Group concerned with problems associated with the analysis of signals produced by wave propagation in ionized media (see Res. IV.2, Working Group H. 3).

Chairmen and Vice-Chairmen of Commissions B and C

Commission VI made the following recommendations to the Council regarding the Chairmen and Vice-Chairmen of the new Commissions B and C :

Commission B : *Chairman :* Prof. J. Van Bladel (Belgium);
Vice-Chairman : Prof. L. B. Felsen (USA).

Commission C : *Chairman :* Prof. B. Picinbono (France);
Vice-Chairman : Prof. V. Zima (Czechoslovakia).

These recommendations were later accepted by the URSI Council.

On behalf of Commission VI, Prof. Stumpers expressed his regret that, owing to pressure of other work, Prof. Knudsen was unable to offer himself as Chairman of one of the new Commissions. He thanked Prof. Knudsen for the work he had done and for accepting the responsibilities of Acting Chairman.

Papers presented during Scientific Sessions

Session on Non-planar arrays.

— Survey of the state of the art in non-planar arrays, G. Borgiotti.
— Analysis and synthesis of arrays on cylindrical and conical surfaces, A. T. Villeneuve.
— Mutual coupling in arrays on conformally curved surfaces, A. Hessel.
— Experimental techniques for non-planar arrays, J. H. Provencher.
— Small non-planar arrays, G. A. Thiele.

Session on Holography and its influence on electromagnetics.

— A review of microwave holography, K. Izuka.
— Workers in the field of microwave holography, Raj Mittra.
— Research into microwave holography, V. Russo Checcaci.

Session on Special problems in scattering and diffraction I.

Part 1 : High-frequency diffraction.

— Review of ray techniques, G. Deschamps.
— Torsional surface rays, R. G. Kouyoumjian.
— Tracking of fields with complex phase, K. Suchy.
— Diffraction of Gaussian beams, L. B. Felsen.

Part 2 : Inverse scattering.

— Review of inverse scattering methods, Raj Mittra.
— Profile determination from experimental data, J. Ch. Bolomey.

Part 3 : Transient scattering.

— Review of the singularity expansion method, F. M. Tesche.
— Open problems in transient scattering, C. Baum.

SESSION ON SPECIAL PROBLEMS IN SCATTERING AND DIFFRACTION II.

— Geometrical theory of diffraction and integral equations. A survey and comparison of numerical aspects, H. Bach and J. Hansen.
— Computational aspects of the integral equation approach for modeling antenna scattering problems, Raj Mittra.
— A survey of transient techniques in electromagnetics, E. K. Miller.
— The least-square boundary residual method, J. B. Davies.
— Application of differential methods to the determination of fields in the vicinity of diffracting structures, R. Petit.
— Scattering of electromagnetic waves by rotating bodies, J. Van Bladel.
— Transport of energy in electromagnetic fields, H. H. Meinke and F. Landstorfer.

SESSION ON MILLIMETRE WAVE AND OPTICAL WAVEGUIDES.

— Principles of signal transmission in optical fibers, D. Gloge.
— Preparation and properties of silica-based fibers, W. A. Gambling.
— Preparation and properties of compound glass fibers, T. Uchida.
— Guiding structures for integrated optics, R. Ulrich.
— Circular electric waveguide research, S. Okamura.

SESSION ON ANTENNAS FOR SATELLITE COMMUNICATIONS.

— Multiple-beam ground-station antennas, G. Hyde.
— A review of satellite communication within ESRO, Henning Bach.
— Antennas for the Japanese domestic satellite system, T. Satoh.
— Advances in prediction methods for reflector antennas, W. V. T. Rusch.

SESSION ON DIGITAL FILTERS.

— Theory and design of wave digital filters, A. Fettweis.
— Techniques de réduction de la vitesse de calcul dans les filtres numériques, M. G. Bellanger.
— Combining digital signal analysis of linear prediction and homomorphic filtering, A. V. Oppenheim.
— Digital signal processing in sound and vision, F. W. de Vrijer.

SESSION ON COMPUTER SIMULATION OF COMMUNICATION SYSTEMS.

— Computer simulation methods for channel coding, symbol synchronisation and demodulation, F. Dolainsky, B. Dorsch, F. Edbauer and E. Stolle.
— Analytic methods for use in simulation of signal processing in satellite transponders, J. K. Skwirzynski.

SESSION ON OPTICAL COMMUNICATIONS : SYSTEMS (organised jointly with Commission VII).

— Research on fibre optic communication systems in the United Kingdom, M. M. Ramsay, C. P. Sandbank.
— System bandwidth of optical fibre transmission lines, W. A. Gambling.
— The development of the VLP, E. Spitz.

Commission VII on Radio Electronics

Chairman : Prof. A. L. Cullen (United Kingdom).

Vice-Chairman : Prof. A. Smoliński (Poland).

COMMISSION D

It was agreed that the new Commission D should deal with physical phenomena and devices for applications in radio science. The recommended short title is Physical Electronics and Devices.

Symposia

Commission D should not try to arrange symposia which compete with the many specialist events already being organised in various parts of the world.

URSI Assemblies already tend to be rather long and the addition of open symposia just before the beginning of an Assembly would extend the duration too much.

It was recommended that a one-day open symposium on optical devices be included in the programme for Commission D in Helsinki (Res. VII.1).

Programme for Helsinki 1978

The programme for the next Assembly should be decided jointly by the Chairman and the Vice-Chairman who should designate an organiser to take responsibility for each session. The programme should be decided very early in 1977.

There is a need for more detailed advance information about the programme for all the Commissions. Otherwise the potential interdisciplinary value of the Assembly is diminished. Ideally every participant should receive, when he registers, a list of speakers and titles of papers, with times and locations, for all the Commissions.

Election of Vice-Chairman

The Council accepted the Commission's recommendation for the Vice-Chairman of Commission D, namely Prof. W. G. Farnell (Canada).

Papers presented during Scientific Sessions

Session on Quantum frequency standards including optical standards (organised jointly with Commission I).

— Status report on primary frequency standards in N. America and Europe, H. Hellwig.

— A review of selected problems concerned with further development of atomic clocks, S. Hahn.

— NPL long-beam caesium standard, J. McA. Steele.
— Status report on primary caesium standards, G. Becker.
— Optically pumped secondary frequency standards, S. Leschiutta.
— Optical frequency standards — problems and prognosis, J. L. Hall.
— Laser frequency stabilisation by extra narrow spectral lines, M. E. Zhabotinskij.
— Laser frequency stabilisation, T. Tako.
— Accuracy of optical frequency standards, F. Hartmann.

SESSION ON MICROWAVE ACOUSTICS (organised jointly with Commissions V and VI).

— Acoustic surface waves, G. W. Farnell.
— Astronomical applications of microwave acoustics, T. Cole.
— Surface acoustic wave frequency filters in communication systems, K. A. Ingebrigtsen.

SESSION ON MEMORIES AND LARGE-SCALE INTEGRATION.

— Optical storage of information — the state of the art, E. Spitz.

SESSION ON MILLIMETRE AND SUB-MILLIMETRE TECHNIQUES.

— The generation of millimetre and sub-millimetre waves, G. Convert.
— A recent development in millimetre-wave techniques for communications in Japan, S. Okamura.
— Millimetre waveguide communication, H. G. Unger.
— Millimetre-wave modulation of CO_2 lasers, E. Bonek.

SESSION ON OPTICAL COMMUNICATIONS (DEVICES) (organised jointly with Commission VI).

— Optical thin-film waveguides and passive devices and their similarity to acoustic surface wave structure, A. A. Oliner.
— Research on optical fibres for communications in Italy, P. F. Checcacci, A. M. Scheggi.
— Etudes récentes sur les dispositifs pour communications optiques, J. le Mézec.

SESSION ON MICROWAVE SOLID-STATE DEVICES.

— Transferred electron devices — from birth to maturity, C. Hilsum.
— Avalanche diodes for microwave power generation from 5 GHz, P. Weissglas.
— Interaction of microwave magnetostatic waves with charges in semiconductors, L. Millanta, N. Rubino.
— Electron diffusion in hot electron microwave devices, B. R. Nag.

Commission VIII on Radio Noise of Terrestrial Origin

Chairman : Prof. N. D. Clarence (South Africa).

Vice-Chairman : Dr. Ya. I. Likhter (USSR).

In the absence of the Chairman and Vice-Chairman, Dr. F. Horner (Chairman 1969-1972) took the Chair at the Business Meetings at the request of the Board of Officers.

TERMS OF REFERENCE OF COMMISSION E

In view of the possible overlap between the terms of reference of proposed Commissions E and C and uncertainty about the topics to be covered by Commission H, there was a serious discussion on the viability of Commission E. However the consensus of opinion was that the formation of Commission E should proceed. It should study natural and man-made sources of noise as well as the composite noise environment. It would also have a joint interest, with other Commissions, in the effects of noise on system performance and in the scientific basis for noise control and the utilisation of the spectrum.

REVIEW OF RADIO SCIENCE

The following views emerged following a discussion on the desirability or otherwise of continuing the publication of *Review of Radio Science.*

1. It is desirable that URSI should be identified with a review of some kind.

2. The review should be written so as to permit participants at Assemblies, and similar specialists, to gain a rapid insight into the main developments in the field of all the Commissions. It should also permit the telecommunications engineer to keep abreast of scientific developments relevant to his work. The present type of review is too long and too detailed to satisfy these needs.

3. It would be more useful to distribute the review well before the Assembly or, alternatively, soon afterwards so that it could include significant new material emerging from the Assembly.

4. The success of the review must depend heavily on the work of writers and editors. In order to ensure the cooperation of the best people, the workload should be eased for example by aiming at shorter and more selective articles.

CCIR Questions

It seems likely that, with a few exceptions, the best advice from scientists interested in natural noise is already available to CCIR through channels other than URSI. This may also be true for man-made noise but the URSI Working Group on Man-made Noise should be consulted on this point.

Future Symposia

Several topics for future symposia were suggested (see Res. VIII.1).

Several conferences, with international participation, on man-made noise and electromagnetic compatibility are already being planned and URSI should consider cosponsorship of some of them. It would be undesirable for URSI to organise another symposium on this general topic. However, a more specialised symposium on the effect of noise on system performance would be appropriate.

Elections

In accordance with the recommendation of Commission VIII, the URSI Council elected Mr. G. H. Hagn (USA) as Vice-Chairman of Commission E.

Papers presented during Scientific Sessions

The sessions organised jointly by Commissions IV and VIII are referred to in the Section dealing with Commission IV.

URSI OPEN SYMPOSIA IN LIMA

At its meeting in March 1974, the URSI Board of Officers noted that there was a serious risk of overlap between, on the one hand, the subjects to be discussed by URSI Commissions III, IV and VIII during the General Assembly in Lima in August 1975 and, on the other, those to be covered by the symposia being organised, a few weeks later, by IAGA in connection with the IUGG General Assembly in Grenoble.

The URSI Board agreed that, as far as possible, the URSI programme in the field of upper atmospheric physics should concentrate on those aspects of the ionosphere and the magnetosphere which are concerned with wave phenomena and which have some bearing on radiocommunications. It was considered best for URSI to avoid topics of purely geophysical interest which could more appropriately be discussed during the IAGA meetings.

The URSI Board decided that Commissions III, IV and VIII would cooperate in the organisation of a group of open symposia dealing with the following topics :

A. Radio waves and the ionosphere.
B. Non-stationary signal analysis.
C. Telecommunication noise and the interference environment.

It is worth recalling that URSI also cosponsored several of the scientific sessions on atmospheric physics arranged by IAGA in Grenoble; however, IAGA was a cosponsor of the URSI sessions on equatorial ionosphere in Lima.

The papers presented at the URSI Symposia in Lima are given below.

Symposium A. — Radio Waves and the Ionosphere

Programme Committee : W. J. G. Beynon *(Chairman)*, H. G. Booker, S. A. Bowhill, J. W. King.

SESSIONS ON EQUATORIAL IONOSPHERE.

F Region.

— The rôle of ambipolar diffusion in the development of the equatorial anomaly in solar maximum and minimum periods, M. R. Sivaranam, R. Suhasini, R. Raghavarao.

— Diurnal and seasonal variations in the ionospheric F layer at low latitudes, O. Awe.

— Influence of thermospheric winds on the low-latitude ionosphere, R. Rüster, J. W. King.

— The influence of the equatorial electrojet on the distribution of ions in the F2 region, V. Yj. Gajdukov, Yj. A. Romanovskiy.

— Upward-moving irregularities over the magnetic equator, R. G. Rastogi, K. N. Iyer.

— Spread-F irregularities near the magnetic equator, R. G. Rastogi, M. R. Deshpande.

— A driving mechanism for the spread-F phenomena of the equatorial anomalous belt, N. D. Kaushika, C. S. G. K. Setty.

— Breaking-wave structure in the electron density profiles of the night-time equatorial ionosphere, J. Röttger.

F-Region dynamics and fields.

— Partial reflections : A source of weak VHF equatorial spread-F echoes, B. B. Balsley, D. T. Farley.

— Equatorial spread-F studies at VHF : A comparison between observations at different longitudes, B. B. Balsley, D. A. Carter, W. L. Ecklund, R. A. Greenwald, G. Haerendel.

— Observations of F-region, R. F. Woodman, C. LaHoz.

— Further studies of the equatorial ledge, T. E. VanZandt, J. M. Warnock, D. N. Anderson.

— Atmosphere Explorer measurements of ionospheric structure and motions near the magnetic equator, W. B. Hanson, D. L. Sterling.

— Drifts and electric fields at the magnetic equator, C. H. J. Calderon, R. F. Woodman.

— Vertical ionization drifts in the lower equatorial ionosphere and the meridional current system, B. B. Balsley, D. A. Carter, R. F. Woodman.

— Seasonal variations in the low-latitude dynamo system, E. K. Walton, S. A. Bowhill.

E-Region irregularities.

— Irregularities in the equatorial E region : A review, D. T. Farley.

— Concerning the ion-acoustic limit of the Type I phase velocities, R. A. Greenwald, B. B. Balsley, D. A. Carter, W. L. Ecklund.

— Plasma instabilities (Type I and Type II) observed in Central Africa at 21 MHz, C. Hanuise, J. Gagnepain, M. Crochet.

— Characteristics of E-region irregularities over the magnetic equatorial region during magnetic storms, M. R. Deshpande, B. Singh, R. G. Rastogi.

— Vertical radar observations of Type I irregularities in the equatorial electrojet, B. G. Fejer, D. T. Farley, B. B. Balsley, R. F. Woodman.

— The effects of the gradient-drift term on Type I electrojet irregularities, D. T. Farley, B. G. Fejer.

— Investigation of the electrojet in Africa by the coherent radar technique, M. Crochet, J. Gagnepain, C. Hanuise.

— Radar studies of anomalous drift velocity reversals in the equatorial ionosphere, B. G. Fejer, D. T. Farley, B. B. Balsley, R. F. Woodman.

— Electric fields in the equatorial ionosphere, B. G. Anandarao, P. D. Bhavsar, J. N. Desai, G. Martelli, R. Raghavarao, P. Rothwell.

— Equatorial sporadic E — its properties, R. G. Rastogi.

— Aspect sensitivity of E- and F-region irregularities, C. H. J. Calderon, R. F. Woodman.

— Drift measurements of equatorial sporadic E at Ibadan — interpretation and results, J. O. Oyinloye, J. Akinrimisi.

— Ionization irregularities in the E region during counter-electrojet, S. Prakash, S. P. Gupta, H. S. S. Sinha, T. R. Rao.

— Ionization irregularities and electron drift velocities in the equatorial electrojet, S. Prakash, S. P. Gupta, T. R. Rao, S. Sampath, T. S. G. Sastry.

— Electric fields in the equatorial E region during periods close to the reversal of electrojet currents, S. Prakash, P. Muralikrishna.

— Neutral wind and temperature measurements in the equatorial E region, B. B. Balsley, D. T. Farley, B. G. Fejer.

— Equatorial irregularities as seen through VHF scatter records, R. G. Rastogi, M. R. Deshpande.

SESSIONS ON ARTIFICIAL HEATING OF THE IONOSPHERE AND ITS EFFECTS.

— Field-aligned irregularities produced by artificial heating of the ionosphere (Review), S. A. Bowhill.

— Kinesonde observations of the ionospheric perturbations from intense electromagnetic fields, J. W. Wright.

— Bistatic measurements of radio-frequency scattering from a heated ionospheric volume, J. Minkoff, M. Laviola, S. Abrams, D. Porter.

— Cross-section calculations for aspect-sensitive radio-frequency scattering from a heated ionospheric volume, J. Minkoff.

— VHF/UHF field-aligned and plasma-wave scattering from a heated ionospheric volume, J. Minkoff, P. Kugelman, I. Weissman.

— A simple model for monostatic and bistatic field-aligned scatter from an artificially heated F layer, S. A. Bowhill, E. K. Walton.

— Radio-wave scattering from a heated region of the ionosphere, P. A. Fialer, G. B. Carpenter, V. R. Frank.

— Interpretation of observations of field-aligned scattering from a heated region of the ionosphere, P. A. Fialer, V. R. Frank, L. E. Sweeney, Jr.

— The heating experiment at Arecibo : Introduction to the experimental arrangements, summary of experimental results (Review), W. E. Gordon, H. C. Carlson.

— Parametric instabilities and artificial heating (Review), J. A. Fejer, F. W. Perkins.

— Non-linear generation of oscillations in the Arecibo heating experiment, L. A. V. Dias.

— High-frequency induced plasma line fluctuation at Arecibo, I. J. Kantor.

— Enhanced plasma lines induced in blanketing sporadic E, H. C. Carlson, W. E. Gordon.

— Dependence of sporadic E characters from hydromagnetic processes by ionospheric heating, A. E. Giraldez, I. Mesterman.

— Non-linear phenomena in the ionosphere, A. Kumar, C. S. R. Rao.

SESSIONS ON DRIFTS, WAVES AND OTHER IRREGULARITIES : RESULTS AND INTERPRETATION.

— Some recent research on interpretations of total-reflection ionospheric drift and irregularity measurements, J. W. Wright.

— On the relationships between different methods of analysis of drift records, J. O. Oyinloye, G. B. Onolaja.

— Computer simulation of ionospheric radio drift experiments, M. L. V. Pitteway.

— Simultaneous ionospheric drift observations by different techniques at low and middle latitudes, M. Crochet, J. Tabbagh, N. Makiese.

— Results of E-layer drift measurements at De Bilt, H. J. A. Vesseur.

— Spectral analysis of F-region "drift" measurements in Goose Bay, Labrador, W. Pfister, G. S. Sales.

— Ionosphere waves (Review), S. Kato.

— Spectral studies of electron-density fluctuations at low, mid and high magnetic dip stations, O. P. Nagpal, C. S. G. K. Setty.

— The propagation of a traveling ionospheric disturbance from Mould Bay to Arecibo, W. E. Swartz, Y. Tayan, D. T. Farley, M. C. Kelley.

— Diurnal variations of acoustic-gravity waves in the F region, J. Klostermeyer, C. H. Liu, R. Rüster.

— A statistical study of TID's deduced from ionograms obtained every two minutes at three stations mutually 150 km apart in northern New Hampshire and Vermont, M. G. Morgan, K. A. Ballard, C. H. J. Calderon.

— On wave-like perturbations in the F region, K. Toman.

— Irregularities by gravity waves in the ionosphere, S. Kato, T. Kawakami, D. St. John.

— Gravity waves generated by the 30 June 1973 total solar eclipse, P. Broche, M. Crochet.

SESSIONS ON GLOBAL MODELS OF THE IONOSPHERE, INCLUDING THE INTERNATIONAL REFERENCE IONOSPHERE.

— Status of the International Reference Ionosphere (IRI) (Review), K. Rawer.

— The standard electron-density profile in the F2 region, T. Yonezawa.

— Modeling the nighttime ionosphere above Arecibo, J. S. Shen, W. E. Swartz, D. T. Farley, R. M. Harper.

— Analytical height and time representation of ionospheric electron densities and temperatures over Millstone Hill, J. V. Evans, J. M. Holt.

— Empirical model of the temporal and spatial variations of *foF2*, A. K. Paul, A. R. Laird.

— Daily regional changes of the structure of the F region above Europe in 1958 and 1964, W. Becker.

— The semiannual variations in the peak electron density and the height of the peak of the F2 layer at noon and at midnight, T. Yonezawa.

— The F2-layer seasonal anomaly, H. M. Lumb, C. S. G. K. Setty.

— Models of ionospheric temperature, K. K. Mahajan.

— Telecommunication aspects of F-layer modeling (Review), J. W. King.

— Auroral and equatorial ion composition irregularities : Implications for empirical modeling of diurnal and seasonal variations, H. A. Taylor, Jr., C. A. Reber, P. Bauer, G. R. Cordier.

— The longitudinal dependence of ionospheric parameters measured by the AEROS-A Satellite, C. Münther, K. Spenner, G. Schmidtke.

— On the behaviour of thick layers in the E region, S. M. Radicella, M. M. de Gonzalez, L. Kurban.

— The accuracy of the CCIR F2-layer model at low and middle latitudes, J. W. King, G. Thuillier, J. C. Samuel.

— Contours of total electron content over the Indian sub-continent, R. G. Rastogi, K. N. Iyer.

— Global ionospheric models for predicting the performance of high-frequency communication systems, M. Leftin.

— An empirical electron-density model for use in specifying radio propagation conditions, C. M. Rush.

SESSIONS ON ADVANCES IN COHERENT AND INCOHERENT SCATTER.

— Present and future applications of incoherent scatter to ionospheric investigations : A review, J. V. Evans.

— Summary of high-resolution auroral incoherent scatter measurements, C. L. Rino, V. B. Wickwar.

— Vector ion velocities in the E and F regions over Arecibo : A test of the dynamo theory, R. M. Harper.

— Atmospheric gravity waves generated in the auroral ionosphere, R. D. Hunsucker.

— A study of F2-region vertical ionization fluxes at Millstone Hill, J. V. Evans.

— Comparison of exospheric temperatures at Millstone Hill and St. Santin, J. E. Salah, J. V. Evans, D. Alcayde, P. Bauer.

— Horizontal structure of mid-latitude sporadic-E layers observed by incoherent scatter radar, K. L. Miller, L. G. Smith.

— Plasma velocity measurements using the UK incoherent scatter radar; P. J. S. Williams.

— Radar observations of winds, waves, and turbulence, J. L. Green, T. E. Van Zandt, J. M. Warnock, R. H. Winkler.

— Partially reflecting irregularities in the lower ionosphere, R. A. Vincent.

— Gravity waves in the equatorial mesosphere, P. K. Rastogi, S. A. Bowhill.

— Radio evidence for intermittent mesospheric turbulence, P. K. Rastogi, S. A. Bowhill.

— Preliminary results of the Jicamarca lower atmosphere winds programme : stratosphere, R. M. Harper, R. F. Woodman, W. E. Gordon.

— Preliminary results of the Jicamarca lower atmosphere winds programme : mesosphere, R. M. Harper, W. E. Gordon, R. F. Woodman.

— The rôle of meteoric intrusive material in the E region, C. D. Ellyett.

— Simultaneous partial reflection and meteor wind observations near Urbana, Illinois, during the winter 1974-75, M. A. Geller, G. C. Hess, D. S. Wratt.

— EISCAT, a progress report, T. Hagfors.

— Temperature gradient and ion composition results from incoherent scatter data, W. L. Oliver.

SESSION ON IONOSPHERIC ABSORPTION.

— Ionospheric absorption between 53° N and 53° S observed on board ship, H. Schwentek.

— Measurement of D-region electron density near the geomagnetic equator, F. Walter, A. Gomes.

— The absorption of medium waves in the nighttime ionosphere at oblique incidence, W. Dieminger, W. Elling.

— Sky-wave field strength of the Rome transmitter at 845 kHz observed on board a ship at distances between 1,100 and 12,000 km, H. Schwentek, K. H. Geisweid.

— SCL and its dependence on season and X-ray flux density from a solar flare, S. N. Mitra.

— D region at low latitudes using the partial reflection technique, J. S. Shirke, S. N. Pradhan.

— Limitations of longitudinal approximation to the generalized magnetoionic formula, J. S. Shirke, S. N. Pradhan.

— A study of a particle precipitation event in the lower auroral D-region by means of partial reflections, A. Brekke, A. Haug, E. V. Thrane.

SESSION ON D REGION, INCLUDING VLF AND ELF PROPAGATION.

— ULF electromagnetic fields in the ionosphere associated with thunderstorms — review of recent work, J. R. Wait.

— A theory of the transmission of VLF waves across the antipodes, H. G. Booker.

— VLF propagation near the plasmapause, F. Walter.

— The polarization of VLF waves reflected from the ionosphere, C. T. Spracklen, T. B. Jones.

— Electromagnetic scattering from an irregular multilayered model of the earth-ionosphere waveguide, E. Bahar.

— Generation of ULF waves by electric or magnetic dipoles, K. J. Harker.

SESSIONS ON IONOSPHERIC SCINTILLATION EFFECTS AND F-REGION IRREGULARITIES.

— Interpretation of scintillation recordings (Review), E. J. Fremouw.

— Locally homogeneous irregularity structures and ionospheric irregularities, C. L. Rino, E. J. Fremouw, R. C. Livingston.

— Some scintillation effects of transionospheric radio signals, K. C. Yeh, C. H. Liu.

— Power spectra of ionospheric scintillations, C. H. Liu, K. C. Yeh, A. W. Wernik.

— An improved empirical model for scintillation, E. J. Fremouw, C. L. Rino.

— Micro-instabilities and the production of short-wavelength irregularities in the auroral F region, E. Ott, D. T. Farley.

— High latitude scintillations during magnetic activity, J. Aarons.

— Elementary theory of field-aligned scattering measurements, J. Minkoff.

— The morphology of equatorial scintillations (Review), J. Aarons.

— Ionospheric phase and amplitude scintillation at 150 and 400 MHz, R. K. Crane.

— A theory of spread-F and flutter fading based on field-aligned irregularities, H. G. Booker.

— Near equatorial spread-F in the Australasian zone, D. G. Cole.

— The nature and occurrence of equatorial scintillation, J. Aarons, H. Whitney, J. P. Mullen, G. S. Hawkins, A. Bushby, J. Lanat, L. dos Santos Lucena.

— Experimental observations and a proposed explanation of very long delayed radio echoes from the ionosphere, F. W. Crawford, D. M. Sears.

SESSION ON DATA PROCESSING IN IONOSPHERIC RESEARCH.

— The evolving rôle of data processing in radio probing of the ionosphere — (Review), J. W. Wright.

— On the estimation of Doppler shift and spectral width, R. F. Woodman.

— Applications of the FFT in backscatter radar, C. LaHoz, R. F. Woodman.

— A new digital control and processing system for the Jicamarca radar, A. Guillen, C. Gonzales, C. LaHoz, Urquizo, R. F. Woodman.

— Real-time data processing for meteor-radar, partial-reflection and ionosonde experiments, S. A. Bowhill, G. C. Hess, W. R. Owens.

— Processing of incoherent scatter autocorrelation functions, W. E. Swartz, D. T. Farley, D. Cole, E. Costa.

— Design of Barker code multiple experiments, C. J. Zamlutti.

— Ionogram inversion techniques used by the National Geophysical and Solar-Terrestrial Data Center Boulder, Col., USA, J. V. Lincoln, R. O. Conkright.

— Data processing for oblique sky-wave signals (Review), J. M. Kelso.

— Some modern developments in ionospheric radio sounding; their applications in the IMS and beyond, J. W. Wright, A. K. Paul.

— Errors induced in HF radio direction finders by traveling ionospheric disturbances, T. B. Jones, C. T. Spracklen.

— The use of a programmable desk calculator in a VLF propagation experiment for control and data logging, T. B. Jones, C. T. Spracklen.

— Amplitude and direction of ionospheric echoes measured by a directional ionosonde, J. Koehler.

— Measuring the angles of arrival of HF sky-wave signals, J. M. Kelso, R. N. DeWitt, H. A. Dodson.

— Wide-band phase meter, G. Tisnado.

SESSIONS ON IONOSPHERIC PROPAGATION PROBLEMS IN RADIO COMMUNICATION.

— Ionospheric problems in radio telecommunications (Review), W. F. Utlaut.

— Determination of ionospheric parameters from backscatter ionograms, P. J. D. Gething.

— Formation phases of equatorial spread-F irregularities observed by transequatorial radio propagation, J. Röttger.

— Report on 9 years of observations of Hawaiian TV and FM signals received in Rarotonga, Cook Islands, by the nighttime transequatorial mode, S. G. Kingan.

— Unusual propagation modes on transequatorial circuits, L. F. McNamara.

— Ionospheric predictions for communications — some outstanding problems, L. W. Barclay.

— F-layer reflections observed on long-distance medium-wave propagation, Th. Damboldt, R. Eyfrig, H. G. Möller.

— The optimization of communication frequency selections, R. G. Maliphant.

— Multipath connection between satellites in the undermost part of the ionosphere, M. S. Smith.

— Profile inversion by the integral equation approach for electromagnetic waves probing inhomogeneous media, P. Edenhofer.

— Time-lapse movie film of the ionosphere, G. Webster, D. Horton.

SESSION ON IONOSPHERIC PHENOMENA RELATED TO THE MAGNETOSPHERE, AND NEW TOPICS.

— Simultaneous observation of whistlers at two $L > 4$ Alaskan stations, M. G. Morgan.

— Some results of direction-finding studies of two-hop whistlers, M. J. Rycroft, M. J. Jarvis, H. J. Strangeways.

— The high-latitude ion trough : A signature of dynamics in the ionosphere and neutral atmosphere, H. A. Taylor, Jr., H. C. Brinton, G. P. Newton.

— Plasmapause sounder, T. Ondoh, I. Kasuya.

— Rocket observation of electrostatic instabilities in relation to sporadic-E layers, E. Ungstrup.

Symposium B. — Non-stationary signal analysis

Programme Committee : R. Gendrin *(Chairman)*, F. L. Locke, F. L. Stumpers.

SESSIONS ON MATHEMATICAL AND TECHNICAL ASPECTS.

— Fast least-squares algorithms for a class of non-stationary processes, T. Kailath.

— Conditionally stationary processes — theory and applications, B. Mandelbrot.

— Stationary signals with stationary increments — theory and applications, B. Picinbono.

— Maximum entropy spectral estimation from a statistical point of view, E. Parzen.

— Processing of discontinuous signals with applications to computer networks, A. Segall.

— A modular approach to linear transforms using transversal filters, H. J. Whitehouse, R. W. Means, J. M. Speiser, E. H. Wrench.

— Coding for non-stationary sources, R. Bernal, J. K. Wolf.

— Estimation theory of the power-density spectrum of a non-stationary process, A. E. Karbowiak.

— High-resolution analysis of multiple signals, J. V. Murphy.

SESSIONS ON MAGNETOSPHERIC ASPECTS.

— The automatic detection and analysis of VLF signals using the phase coherency between two components, D. Jones.

— Calculations with digital "Sonograms", G. J. Daniell, C. Papanicolaou.

— Instantaneous amplitude and frequency of a time-varying signal; application to the fine structure of ULF and magnetospheric emissions, C. Berthomier.

— Automatic real-time detection and direction-finding of VLF signals, M. K. Leavitt.

— Computer aspects of the analysis of magnetospheric ULF waves, R. L. McPherron.

— Theory and practice for measurement of non-stationary signals in the time-frequency domain, J. L. Lacoume, W. Kofman, F. Glangeaud.

— Analysis of random electromagnetic wave fields from the measurement of their six components, F. Lefeuvre, L. R. O. Storey.

— A comparative study of three techniques of using the spectral matrix in wave analysis, C. W. Arthur, R. L. McPherron, J. D. Means.

— Numerical analysis of non-stationary signals, K. Kodera, C. de Villedary.

— Digital analysis of ionospheric duct propagated Pcl geomagnetic pulsations, B. J. Fraser.

— Geomagnetic pulsations caused by field-aligned current sheets and the polar electrojet, K. Wilhelm, J. W. Munch.

— Analysis of a ground station and onboard a geostationary satellite, R. L. McPherron, N. Cornillau-Wehrlin.

— Power spectra of chorus and magnetic pulsations, S. K. Adjepong, M. J. Rycroft, D. Orr.

— The semi-automated whistler analyser, K. Bullough, A. J. Smith, G. Garside, A. M. Deeley.

SESSION ON ACOUSTICAL AND RADIOBIOLOGICAL ASPECTS.

— Transmission channel characterization. Application to submarine and aerial acoustic channels, J. L. Lacoume.

— Present situation in the study of animal sonar systems using signal processing, B. Escudié.

— Scattering theory, D. Middleton.

SESSION ON ASTRONOMICAL ASPECTS.

— Atmospheric turbulence in optical and radio astronomy, J. C. Ribes.

— Theory of strong scintillation with application to radio astronomy, J. B. Jokipii.

— Motion of the interstellar medium and the anomalous velocities of pulsar scintillation patterns, B. J. Uscinski.

— The study of interplanetary signals using spacecraft radio signals, R. Woo.

— Restoration of astronomical images degraded by atmospheric turbulence, F. Roddier.

— Lunar occultation observation of 400 extragalactic sources, G. Swarup, V. K. Kapahi, C. R. Csubrahmanya.

— Phase interférométrique en ondes millimétriques observée à Bordeaux, J. M. Robillot.

— Amplitude-modulated noise. An empirical model for the radiation received from pulsars, B. Rickett.

Symposium C
The Telecommunication Noise and Interference Environment

Programme Committee : N. D. Clarence *(Chairman)*, G. H. Hagn, Ya. I. Likhter, F. L. Stumpers.

SESSION ON SOURCES OF ATMOSPHERICS.

— Radio emissions from lightning, J. B. Smyth.

— The time domain of lightning discharge processes, S. Lundquist, V. Scuka.

— On the time and amplitude properties of the electric field strength near the source of atmospherics in VLF and HF bands, T. Nakai.

— Noise from severe storms, W. L. Taylor.

— Frequency spectra of field changes due to lightning dependent on distance and type of discharge, R. Mühleisen.

— Determination of effective characteristics of the world lightning activity from the results of synchronous investigations of Schumann resonances in widely separated points, V. N. Bormotov, B. V. Lazebny, A. P. Micholaenko, L. M. Rabinowicz.

SESSION ON MODELS OF NOISE, INTERFERENCE, AND SYSTEM PERFORMANCE.

— Statistical-physical model of man-made and natural electromagnetic interference, D. Middleton.

— Optimum reception in an impulsive interference environment, A. D. Spaulding.

— Noise immunity in synchronous reception of digital signals, S. S. Sviridenko.

— Predicting the compatibility of high-frequency sky-wave communication systems, G. W. Haydon.

— Performance model of radio systems with active antennas, H. K. Lindenmeier.

— Electromagnetic fields from a dielectric-coated coaxial cable with an interrupted shield, J. R. Wait.

SESSION ON DIRECTION FINDING OF ATMOSPHERICS.

— The worldwide patrolling of atmospherics activity by single stations, W. Harth.

— VLF sferics parameter analysis, R. V. Anderson.

— Real-time location of atmospherics by a single station, K. Sao, H. Jindoh.

— Some considerations on the polarization error in direction finding of atmospherics, M. Yamashita, K. Sao.

— Location of lightning sources of whistlers received aboard satellites over Europe — Typical waveforms of causative atmospherics, M. Tixier.

SESSION ON THE NOISE AND INTERFERENCE ENVIRONMENT.

— Atmospheric-noise characteristics, S. V. C. Aiya.

— Diurnal, seasonal and solar variations of the atmospheric radio noise in Taiwan, Yinn-Nien Huang.

— Man-made radio noise in Japan, R. Sato.

— Sampling, sequential register, and fast analysis of signals or noise, A. Picquenard.

— Interference measurement, R. J. Matheson, A. D. Spaulding.

— The effects on radio-astronomical observations of radiation from the ATS-6 and SMS-1 satellites, J. W. Findlay.

— Comparison of terrestrial noise measurements by satellite, F. Horner.

REPORTS AND DISCUSSION ON NOISE AND INTERFERENCE.

— Results of the Electromagnetic Compatibility Symposium in Montreux, F. L. H. M. Stumpers.

— Report of URSI Commission VIII Working Group on Man-made Noise, G. H. Hagn.

— Panel discussion on international activities in radio noise and interference.

— Recent noise and interference related activities of URSI, G. H. Hagn.

— Recent activities of the CCIR on atmospheric and man-made radio noise, A. G. Hubbard.

— New developments in CISPR, F. L. H. M. Stumpers.

— The Institute of Electrical and Electronics Engineers (IEEE) and noise and interference, W. E. Cory.

— Recent activities of the International Commission on Atmospheric Electricity, H. Dolezalek.

REVIEW OF ACTIVITIES OF INTER-UNION COMMISSIONS AND PERMANENT SERVICES OF FAGS

The following summary was prepared by the Secretary General for consideration by the URSI Council.

Inter-Union Commissions

Inter-Union Commission on Frequency Allocations for Radio Astronomy and Space Science (IUCAF)

The Commission met in Warsaw (August 1972), Konstanz (May 1973), and Bonn (July 1974) and will meet in Paris in October 1975.

Following discussions between IAU, URSI and COSPAR in 1972, it was agreed to reduce the number of representatives of each of these bodies to two. The smaller membership has made it possible to hold a regular annual meeting and has not decreased the effectiveness of the Commission. Regular meetings are considered to be particularly important in view of the need for radioastronomers and space scientists to prepare their case well in advance of the World Administrative Radio Conference to be convened by ITU in 1979. The necessary contacts with CCIR and IFRB are maintained through the Advisors, appointed by these bodies, who regularly attend the IUCAF meetings.

Contact with scientists engaged in research is maintained through National Correspondents in 26 countries in which there is an interest in radioastronomy or space science.

During the past three years, particular attention has been given (*a*) to the problem of deciding what degree of protection can be reasonably requested for the increasing number of molecular emission lines; (*b*) to the increasing risk of interference from meteorological satellites which transmit information to the ground stations; (*c*) to the development of a world-wide microwave landing system for airports, which constitutes a risk to certain bands used in radioastronomical observations; (*d*) to making advance plans for the CCIR meetings leading up to WARC 1979.

The Secretary General of URSI will relinquish his responsibilities as Secretary of IUCAF after the meeting in October 1975.

Inter-Union Commission on Studies of the Moon (IUCM)

Several Unions, including URSI, and COSPAR agreed to form IUCM in 1970. The Commission was intended to deal with the coordination of the collection and study of information about the Moon, and with the organisation of ICSU meetings and symposia in this field. The activities of IUCM have been concentrated mainly on lunar geography and geology and on the definition of a system of lunar coordinates. URSI could make no major contribution to such topics and the Board agreed to withdraw from IUCM at the end of 1973. Informal contacts with IUCM have, however, been maintained.

Since 1973 there has been some criticism of IUCM because it has tended to act as an independent body and to duplicate some of the activities of the Unions themselves. At the ICSU Assembly in 1974, it was decided to terminate IUCM in September 1975.

In view of the inclusion of planetary studies in IAGA, following the reorganisation in 1973, and the consequent overlap with the field of several IAU Commissions, ICSU was asked to consider the formation of a new Inter-Union Commission covering both the Moon and the planets.

In 1974 ICSU set up a Working Group to discuss whether such a Commission was necessary, or whether the need for collaboration between the Unions could not be met by a less formal procedure. It is agreed that any new body which may be formed must act in a coordinating capacity and must not itself organise scientific meetings or initiate other independent activities. The Working Group will report to the ICSU General Committee in September 1975.

Inter-Union Commission on Radio Meteorology (IUCRM)

Since the 1972 Assembly, the Commission has met in Nice, in October 1973, and in Bournemouth in May 1975. Both these meetings were timed to coincide with colloquia organised by IUCRM on, in 1973, the structure of precipitation and, in 1975, on the probing of the constituents of the atmosphere using radio waves and including infra-red techniques.

In 1972 there were discussions in URSI and IUGG on the future scientific objectives of IUCRM and its structure. In the absence of clear conclusions regarding the need for changes, in August 1972 URSI Commission II recommended (Warsaw, Rec. II.1) that during the next three years, IUCRM "should pay particular attention to the problems associated with the atte- " nuation of em radiation by precipitation, including studies of the spatial " structure of rain showers and how it varies with time ". The coincidence of the URSI and IUGG Assemblies in 1975 will facilitate a concerted reassessment by the two Unions of the future rôle of IUCRM.

In the opinion of the Chairman and Vice-Chairman of URSI Commission II (February 1975) IUCRM provides an excellent example of satisfactory cooperation between URSI and IUGG (IAMAP), and they believe that it is desirable to maintain the present scale of membership (6 designated by URSI and 6 by IUGG) in view of the wide range of topics covered by the term radiometeorology. No specific recommendation has yet been made by Commission II regarding the topics on which IUCRM should concentrate during the next few years.

Suggestions have been made that IUCRM should deal also with radio-oceanography. The President of IAPSO has pointed out that radio observations of the sea refer only to its surface characteristics and that these are strongly influenced by the state of the lower atmosphere. Therefore it would be appropriate to add radio-oceanography to IUCRM which already includes meteorologists and other scientists interested in the application of radio techniques in meteorological studies.

An alternative suggestion has been made for the creation of a separate Commission to deal only with radio-oceanography (IUCRO).

It will be desirable for URSI Commission II to express its opinion on these matters in Lima and to transmit them to the IUGG Assembly in Grenoble. However, any proposals concerning the enlargement of the membership of IUCRM, or the creation of a new Commission, would have financial implications and would require the approval of the URSI Council and of IUGG.

II. — Bournemouth Meeting.

At its meeting in Bournemouth in May 1975, IUCRM *expressed the opinion* that radio-oceanography was an important topic and that it would be appropriate to add it to the terms of reference of the Commission. It was *recommended* that the Constitution be amended by the addition of the words italized below :

" The aims of this Commission will be :

" (*a*) to further the study aspects of meteorology which affect the propagation of electromagnetic waves in the atmosphere and *over the surface* of the Earth and through planetary atmospheres;

" (*b*) to further the application of electromagnetic techniques to meteorology. "

The organisation by the Commission of several Colloquia is being considered and the following subjects are of special interest :

(*a*) Boundary-layer studies with special emphasis on remote sensing.

(*b*) Radio-oceanography.

(*c*) Millimetre and sub-millimetre spectroscopy of atmospheric constituents.

(*d*) Probing by passive radiometry.

(*e*) Fine structure of the atmosphere : layers, turbulence, precipitation, etc. (continuation of a series, but with different emphasis).

(*f*) Precipitation : its structure and effects (sequel to the Colloquium in 1973).

The Commission requests an increase in the annual contribution payable by IUGG and URSI from $ 150 to $ 300.

Several changes in the Constitution have been proposed by the Commission and the Chairman of URSI Commission II, and will be considered by Commission II in Lima.

Federation of Astronomical and Geophysical Services (FAGS)
FAGS Council

URSI is interested in the activities of two of the 11 Permanent Services in FAGS : the Bureau International de l'Heure (BIH) and the International Ursigram and World Days Service (IUWDS). UNESCO continues to make a direct grant of $ 25,000/year and ICSU has made supplementary grants of $ 17,000-$ 23,000 since 1972 in which year the ICSU grant was only $ 15,000.

The Services depend heavily, in many cases, on support generously provided by the national organisations in which they or their components are located. However, supplementary funds from international sources are required for expenses which can not be borne by the national bodies con-

cerned. The increased grant from ICSU for 1975 is welcomed since, in many of the Services, expenditure has exceeded income in recent years.

When deciding on the amount of the grant to be paid to a Service, the Council takes into account the combined recommendations of the three interested Unions concerning the "relative priority" of the Services. At present, BIH and IUWDS occupy the 1st and 5th places respectively in the list of 11 services. URSI is represented in the FAGS Council by Prof. Coutrez and M. Thué. The Secretary General of URSI completed his term of office as Secretary of the Council at the end of 1974.

Bureau International de l'Heure (BIH)

BIH is of particular importance to URSI because of the interest of Commission I in the definition of the second, and in the measurement and diffusion of time. The activities of BIH in this field are now recognised by CCIR and CCDS and it has been suggested that some governmental funds should be sought in addition to those received from UNESCO and ICSU. The lack of sufficient funds has tended to reduce the amount of effort that can be devoted to non-routine work and to preparations for desirable future developments.

Mr. J. McA. Steele represents URSI on the Directing Board of BIH. IAU and IUGG are also represented.

International Ursigram and World Days Service (IUWDS)

IUWDS coordinates the collection and distribution, on various time scales, of many types of solar and geophysical data required by the scientific community. The world-wide scale of these operations is indicated by the fact that the 11 Regional Centres which handle the data are situated in Australia, East and West Europe, North America, and South and East Asia.

The expenses of the Service relate mainly to the issue of the *International Geophysical Calendar* each year, and the *Synoptic Codes for Solar and Geophysical Data* at intervals of several years. Part of the expenses of the visits made by the Director to the Centres is paid out of IUWDS funds since the central coordination of the Centres is essential to the satisfactory

operation of the Service as a whole. The activities of the Regional Centres are entirely supported by the national astronomical and geophysical institutes in which the Centres are located.

URSI is represented in the IUWDS Directing Board and Steering Committee by Dr. A. P. Mitra. IAU and IUGG are also represented.

RELATIONS BETWEEN URSI AND OTHER INTERNATIONAL ORGANISATIONS

The following summary was prepared by the Secretary General for consideration by the URSI Council.

UNESCO

The annual grant of about $ 240,000 which UNESCO makes to ICSU is shared between the Unions and ICSU's Special and Scientific Committees. The basic grant received by URSI in 1973 and 1974 was $ 11,375. For 1975 the basic grant has been reduced to $ 8,000, but a supplementary grant of $ 3,500 has been made in view of the General Assembly.

In URSI, UNESCO funds are used in support of the scientific activities of the Union which include :

(*a*) Publications. *URSI Information Bulletin; Proceedings of General Assemblies; INAG Bulletin.*

(*b*) International Meetings. Travel expenses of speakers and participants attending symposia or other meetings at which scientific questions of interest to the Union are discussed.

Both these sets of activities contribute to the maintenance of contacts, on an international scale, between radio scientists in different countries, and between these scientists and URSI. Such contacts assist in the achievement of the main objective of URSI : the stimulation and coordination of international studies in the field of radio science.

It would seem appropriate for the URSI Council to express its appreciation to UNESCO for the support received in the form of these ICSU grants.

International Council of Scientific Unions (ICSU)

In 1972 ICSU adopted new Statutes. In consequence, all the Unions are represented in the new General Committee of ICSU as they were in the

former Executive Committee. The new Executive Committee includes only two Union representatives who are elected by the General Committee. The Executive Committee is responsible for the general direction of the affairs of ICSU, including finance and administration, while the General Committee deals with scientific questions. Thus the individual Unions no longer have direct contact with the Executive Committee and must act through one of the two Union representatives. Prof. C. de Jager represents URSI and several other Unions in this Committee.

The reduction of the basic URSI grant from $ 11,375 to $ 8,000 follows a reclassification of the Unions, in 1974, based on the recommendations of the ICSU Standing Finance Committee. No clear explanation of the basis for the changes has been forthcoming, but it seems clear that ICSU wishes to give increased consideration to the views expressed by UNESCO : namely that UNESCO grants should be used, preferably, in support of scientific activities which are likely to yield early results of practical value, with particular emphasis on the needs of the developing countries.

In addition, ICSU requires additional funds for the activities of its Special and Scientific Committees some of which are engaged in projects which can not be supported entirely by the Academies that agree to participate in these projects. The proportion of the UNESCO grant which ICSU passes on to the Unions has fallen from 70 % in 1972 to about 60 % in 1975.

Since 1972, ICSU has made an annual charge of 2.5 % of the annual contributions received by the Unions from their members. If the URSI Council agrees to increase the unit contribution payable by Member Committees of the Union to $ 350, the annual charge will be $ 2,000, or 25 % of the basic grant received by URSI from ICSU.

Committee on Space Research (COSPAR)

URSI is represented on the Executive Council of COSPAR by M. J. Voge, Chairman of the URSI Committee on Space Research. The URSI Committee consists of several individual scientists who are asked, on an *ad hoc* basis, to represent URSI at meetings of COSPAR Working Groups. The Committee has been concerned with making suggestions to COSPAR for joint Symposia. In 1973 in Konstanz, two Symposia were arranged, with the joint sponsorship of URSI, on (*a*) applications of space vehicles to Earth-survey problems; (*b*) the lower ionosphere.

Committee on Science and Technology in Developing Countries (COSTED)

The Secretary General is a corresponding member of COSTED, but URSI does not send a representative to meetings of the Committee. The principal concern of COSTED is to coordinate the provision of scientific or technological advice to the developing countries. The funds which ICSU can provide to COSTED are very limited and are used mainly to finance occasional visits by specialists capable of advising on specific problems, and to provide selected scientists from developing countries with funds enabling them to participate in scientific symposia relevant to the needs of their countries.

Scientific Committee on Antarctic Research (SCAR)

URSI does not designate a permanent representative in SCAR. Mlle G. M. Pillet, a member of the French Delegation to the SCAR Meeting in 1974, represented URSI at the Meeting of Delegates. The Working Group on Upper Atmospheric Physics gave special attention to the encouragement of observational programmes in Antarctica during the International Magnetospheric Study (1976-78). Such observations were recommended by URSI Commission IV (Warsaw, Rec. IV.1, 2, 3; 1972).

Special Committee on Solar-Terrestrial Physics (SCOSTEP)

The main responsibility of the Committee is the coordination of the ground and space observations constituting the International Magnetospheric Study (1976-78). This has been timed to coincide with the period during which several orbiting space vehicles will collect data relating to the magnetosphere and interplanetary space. Other short-term programmes of observation are concerned with solar, interplanetary and atmospheric physics. The interdisciplinary character of the programmes is demonstrated by the fact that many of those concerned with them are active in several of the Unions and ICSU Committees that have some interest in the physics of the Earth's atmosphere and its environment in space.

URSI is represented on the Bureau of SCOSTEP by Prof. Beynon who is also Chairman of the URSI-STP Committee consisting of the Chairmen of Commissions III, IV and VIII.

Comité Consultatif International des Radiocommunications (CCIR)

With the help of a number of individual scientists, URSI submitted several documents to the CCIR Study Groups which prepared the Reports, etc. considered by the CCIR Plenary Assembly in 1974.

The Proceedings of this Assembly have recently become available and a new cycle of URSI/CCIR collaboration will begin with the 1977 Assembly in view. Although the Secretary General has acted as URSI/CCIR Coordinator since 1968, it is not possible for him to deal with all the CCIR problems on which URSI might be able to advise. Some delegation of responsibility to the Commissions seems to be needed. However, it is important to bear in mind that a worth-while document on a given subject can be prepared only if it is possible to identify a scientist with the necessary specialised knowledge and experience, and then only if the scientist agrees to prepare the material in a form appropriate to the needs of CCIR and within a rigid time schedule.

The Secretary General visited ITU Headquarters in November 1974 in order to meet the new Director of CCIR, Mr. R. C. Kirby. This occasion provided an opportunity for him to meet also the Secretary General of ITU, M. Mili, and officers of CCITT and IFRB.

World Meteorological Organisation (WMO)

Although a member of the URSI Committee in Switzerland (Dr. J. Rieker) has represented the Union at previous Congresses of WMO, the Union will not be represented at the Congress in 1975. The number of sessions which deal with questions of some interest to URSI is small and does not justify sending someone specially to the Congress.

In 1974, URSI was represented at the WMO Centenary Celebrations in Vienna by Prof. Steinhauser, and in Geneva by Dr. Wehrlin.

International Astronautical Federation (IAF)

When possible, M. Voge has attended the meetings of the IAF Council in Paris on the invitation of the President of the Federation.

RESOLUTIONS AND RECOMMENDATIONS OF THE COUNCIL

C.1. — Reorganisation of URSI

The URSI Council,

resolves

1. that the following be added to the Objects of URSI as listed in Art. 1 of the Statutes :

"(*c*) to stimulate and to coordinate studies of the scientific aspects of "telecommunications using electromagnetic waves, guided and unguided";

2. that the activities of URSI be concentrated on the topics listed in Annex 1 and that this list be reviewed at each General Assembly;

3. that the Commission structure shown in Annex 2 be adopted at the XVIII General Assembly;

4. that, in future, the organisation of symposia that are open to full participation by all interested scientists be a major part of the scientific activities of URSI;

5. that, as part of its activities, each Commission of URSI be asked to propose to the URSI Council at each Assembly an Open Symposium, relevant to its field, to be held before the end of the ensuing Assembly, and to make suggestions for the membership of a Programme Committee;

6. that the Board of Officers be made responsible (*a*) for designating the Chairman of a Programme Committee for such symposia; (*b*) for deciding which symposia should be held at the time of the ensuing Assembly, in accordance with the general rule that the symposia of widest interest should be selected for Assemblies;

7. that Member Committees of URSI be urged to mobilise all the interest that exists in their respective countries in the field of radio-communications science and to bring this interest to bear on the international scene at URSI Open Symposia held at or between General Assemblies;

8. that the President be empowered to engage in discussions with international and national organisations concerned with telecommunications, including remote sensing and optical communications, with a view towards exploring and implementing avenues of cooperation;

9. (*a*) that other organisations interested in promoting international symposia on aspects of telecommunications be invited to cooperate in an arrangement whereby all such symposia fit into a reasonable overall schedule that not merely avoids formal duplication but constitutes sound international planning;

(*b*) that URSI should seek to establish a permanent coordinating body to implement this concept, and should publish at frequent regular intervals the agreed list of such meetings for several years in advance;

10. that the Statutes of URSI be modified so as to eliminate any references, actual or implied, which could be interpreted as imposing restrictions on who may attend scientific conferences of the Union.

ANNEX 1. — *Recommended Topics*

(*a*) Electromagnetic measurement methods, including radio standards and biological interactions.

(*b*) Electromagnetic theory, including antennae and waveguides.

(*c*) Scientific developments in devices for telecommunications, including radioelectronics and microwave sources.

(*d*) Information theory, statistical fluctuation problems, signal processing and computer methods.

(*e*) Communications systems and system theory, including circuits.

(*f*) The electromagnetic noise and interference environment.

(*g*) Remote sensing.

(*h*) Radioastronomy.

(*i*) Wave phenomena in non-ionized media, including radiometeorology and radio-oceanography.

(*j*) Wave phenomena in ionized media, particularly in the Earth's ionized environment, including ionospheric soundings and radio communications (as far as the geophysics of ionized media is concerned, those aspects which do not closely relate to wave phenomena should be excluded).

(*k*) The application of telecommunications science to problems of ITU, through the channels of CCIR and CCITT.

(*l*) The teaching of the science of telecommunications (theory and practice).

ANNEX 2. — *URSI Commissions*

Identification Letter	*Title*
A	*Electromagnetic Metrology* (including radio standards and biological interactions)
B	*Fields and Waves.* Electromagnetic theory and practice (including antennae and waveguides)
C	*Signals and Systems.* Communications systems and system theory (including circuits); information theory and signal processing (including fluctuation problems)
D	*Physical Electronics* and devices
E	Electromagnetic *Interference Environment*
F	*Wave Phenomena in Non-ionized Media* (including radio-meteorology, radio-oceanography and remote sensing of non-ionized media)
G	*Ionospheric Radio and Propagation* (including ionospheric communications and remote sensing of ionized media)
H	*Waves in Plasmas*
J	*Radioastronomy* (including remote sensing of celestial objects).

Notes :

(1) Commissions A, D, E, F and J correspond, respectively, to Commissions I, VII, VIII, II and V, usually with some broadening of the area of interest.

(2) Commissions B and C cover the area of interest of Commission VI.

(3) Commissions G and H cover the present areas of interest of Commissions III and IV. The theoretical aspects of wave propagation in ionized media are covered in Commission H, while communications aspects are covered in Commission G.

(4) It was not considered appropriate to create a Commission to deal with ITU (CCIR and CCITT) matters or with the teaching of telecommunications science since each of these subjects is of interest to several Commissions. It was agreed instead to recommend the formation of :

(*a*) a joint URSI-ITU Committee (including representatives of CCIR and CCITT Study Groups) whose tasks would be to ensure the maximum cooperation between URSI and ITU;

(*b*) an URSI Committee to deal with the teaching of electromagnetics and telecommunications science.

(5) Radio interactions with biological tissues are of interest to several Commissions.

C.2. — Approval of Audited Accounts 1972-1974

The URSI Council,

noting the Report of the Finance Committee dated 13 August 1975;

resolves to approve the audited accounts of the Union for the years ended 31 December 1972, 1973 and 1974.

C.3. — Unit Annual Contributions and Budget 1976-1978

The URSI Council,

considering that it is necessary to reduce the travel and related expenses associated with General Assemblies;

resolves

1. to authorise the payment of these expenses only to the President of the Union, the Secretary General and the Administrative Secretary;

2. to establish an Assembly Emergency Fund for use in cases where the travel expenses of a member of the Board of Officers or of a Chairman of a Commission can not be covered in full by his Member Committee;

3. to adopt the following unit contributions :

1976 US$ 300
1977 US$ 350
1978 US$ 400;

4. to authorise the Chairman of the Finance Committee to prepare the final budget for the years 1976, 1977 and 1978.

C.4. — Publications

The URSI Council,

considering the Report of the Publications Committee dated 12 August 1975;

resolves

1. to accept the recommendations made in the Report;

2. to adopt the proposal that the next issue of the *Review of Radio Science* cover the period 1975-1977 and that it be published in July 1978.

C.5. — Symposia and Working Groups

The URSI Council,

considering

(*a*) that the organisation or the cosponsorship of open symposia by URSI will represent an important aspect of the activities of the Union during the period 1976-78;

(*b*) that, during the XVIII General Assembly, time did not permit a full examination of the proposals made by the Commissions concerning future symposia;

(*c*) that the proposals for the formation of Working Groups within the Commissions were not all available before the end of the Assembly;

resolves

1. to request the Board of Officers to examine the proposals relating to Symposia, colloquia and Working Groups of Commissions and their financial implications;

2. to authorise the Board to make decisions regarding the organisation of symposia and, where appropriate, the formation and activities of Working Groups during the period 1976-78.

C.6. — Standing Committee on URSI General Assemblies

The URSI Council,

noting the success achieved by the Standing Committee on URSI General Assemblies in obtaining invitations for the Assemblies in 1978 and 1981;

resolves

1. to thank the Committee for the efforts it has made;

2. to ask the Committee to continue its work with a view to presenting a report, to the URSI Council at the XIX Assembly, on invitations for the Assemblies in 1981 and 1984.

C.7. — Standing Committee on URSI Membership

The URSI Council,

considering that it is desirable to encourage the adherence of new Member Committees to URSI;

resolves

1. to establish a Standing Committee on Membership consisting of the following :

Prof. O. Awe (Nigeria) : Africa,
Prof. K. Géher (Hungary) : Europe,
Dr. A. Giesecke (Peru) : Latin America,
Prof. S. Okamura (Japan) : Asia;

2. to request the Committee to propose ways of bringing URSI to the attention of radio scientists in territories which have not yet decided to adhere to URSI and to send its recommendations to the URSI Board of Officers.

C.8. — URSI-ITU Committee

The URSI Council,

considering

(*a*) that the reorganisation of URSI will result in a reorientation of the activities of the Union and in the need to give increased attention to radiocommunications;

(*b*) that closer relations between URSI and ITU are desirable;

requests the Board of Officers to consult ITU regarding the possibility of forming a joint URSI-ITU Committee in which the Chairmen of appropriate URSI Commissions and CCIR and CCITT Study Groups would be members.

C.9. — Relations with ICSU

The URSI Council,

considering

(*a*) that, in the General Assembly of the International Council of Scientific Unions (ICSU), the international Scientific Unions and the national Academies of Science have practically equal voting power;

(*b*) that fundamental differences could emerge between the views expressed by the Academies of Science on the one hand and by the Scientific Unions on the other;

requests the Board of Officers to examine the position of the Unions within ICSU and to report its conclusions to the XIX General Assembly.

C.10. — IUCAF

The URSI Council,

considering

(*a*) that the World Administrative Radio Conference (WARC) to be held in 1979 will study the technical requirements and frequency allocations for all radio services, including the use of radio frequencies for scientific research purposes;

(*b*) that the decisions of WARC-1979 can be expected to remain in force for about 20 years;

(*c*) that the deliberations and recommendations of the Inter-Union Commission on Frequency Allocations for Radio Astronomy and Space Science (IUCAF) are the appropriate means of indicating the requirements for radio frequencies for research purposes;

(*d*) that individual national administrations are now making preparations for WARC-1979;

resolves to encourage IUCAF

1. to undertake in a timely manner the deliberations and studies required to determine the needs of radio scientists for the use of the radio spectrum;

2. to bring its recommendations to the attention of the members of URSI, IAU and COSPAR so that those bodies may comment on them;

3. to invite national administrations to include the IUCAF recommendations, as appropriate, in the documents they will prepare for the CCIR and WARC-1979.

C.11. — IUCRM : Radio-oceanography

The URSI Council,

considering

(*a*) that radio-oceanography is a new and growing field of research which involves radio science;

(*b*) that it has already made a substantial impact on the field of physical oceanography;

recommends

1. that, subject to the agreement of IUGG (1), the Inter-Union Commission on Radiometeorology (IUCRM) should make appropriate changes in its Constitution and membership so that it can include radio-oceanography in its terms of reference, at least until the URSI General Assembly in 1978;

2. that Article 1(*a*) of the IUCRM Constitution be modified to read : "to further the study of those aspects of meteorology and oceanography "which affect the propagation of electromagnetic waves through the Earth's "atmosphere and over its surface, and through planetary atmospheres";

3. that consideration be given by URSI and IUGG to the formation of an Inter-Union Commission on Radio-oceanography when the field of radio-oceanography has obtained broader international recognition.

C.12. — IUCRM : Membership

The URSI Council,

considering

(*a*) that it is desirable to make changes in the membership of IUCRM at well-defined dates;

(*b*) that the conditions for convening meetings of IUCRM require clarification;

recommends that, subject to the agreement of IUGG (1), Articles 3, 4 and 7 of the IUCRM Constitution be amended to read :

1. "Art. 3 — The membership of the Commission shall consist of twelve "members, six being nominated by IUGG and six by URSI. Each Union "shall appoint its representatives for a period of six years, and replace half "of them at intervals of three years. The nominations shall be made in suf- "ficient time to become effective at the end of every URSI General As- "sembly";

2. "Art. 4 — The President and Secretary of the Commission shall be "elected by the members for a term of three years, provided that both

(1) During its General Assembly (Grenoble, 25 August-6 September 1975), IUGG accepted this Recommendation.

"of them are not representatives of the same Union. The election shall "be held within a period of three months after the end of each URSI "General Assembly. The officers are eligible for immediate re-election "but normally may not serve more than two consecutive terms".

3. "Art. 7 — The Commission shall meet at least once in each term and, "whenever possible, in association with a General Assembly of either "URSI or IUGG by agreement between these two Unions. In addition, the "Commission shall be allowed to meet at any time if and when matters "relevant to the Commission make it necessary.

"The Commission is encouraged to organise symposia at other times "subject to the approval of the financial arrangements by the Parent "Union".

C.13. — IUCRM : Programme

The URSI Council,

considering

(*a*) that URSI Commission II has identified the following topics as being of special interest for future IUCRM colloquia :

A. Boundary-layer studies.
B. Radio-oceanography.
C. Millimetre and sub-millimetre spectroscopy of the constituents of the atmosphere.
D. Sensing by (passive) radiometry.
E. The fine structure of the atmosphere (but having a different emphasis from previous colloquia in this series).
F. Precipitation : its structure and effects (to extend the colloquium held in Nice);

(*b*) that Commission II believes the two most important topics to be B and A (in that order of priority);

recommends

1. that all these topics be brought to the attention of IUGG and the IUCRM;

2. that a colloquium on radio-oceanography be organised, provided that IUGG agrees to the inclusion of this topic in the terms of reference of IUCRM [1].

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[1] During its General Assembly (Grenoble 25 August–6 September 1975), IUGG accepted this Recommendation.

C.14. — IUCRM : URSI Representatives

The URSI Council,

noting the recommendation of URSI Commission II;

resolves

1. to designate the following representatives of URSI in IUCRM : J. R. Apel (USA), K. Browning (UK), P. Gudmandsen (Denmark), Ya. Melnichuk (USSR), Ph. Waldteufel (France), S. Wickerts (Sweden);

2. to express its appreciation of the excellent accomplishments of IUCRM during the past three years.

C.15. — International Reference Ionosphere

The URSI Council,

noting

(*a*) that Prof. K. Rawer was asked to organise the specification of an International Reference Ionosphere (IRI);

(*b*) that a report entitled "Preliminary Reference Profiles proposed for the International Reference Ionosphere" has been prepared by K. Rawer, S. Ramakrishnan and D. Bilitza (Scientific Report WB2 of the Institut für Physikalische Weltraumforschung, Freiburg, F.R. Germany, July 1975);

resolves

1. to congratulate Prof. Rawer and all those who cooperated with him on the completion of this difficult task;

2. to authorise the Board of Officers to arrange for the publication of certain parts of the Report mentioned above.

C.16. — UNESCO Subvention

The URSI Council,

considering that the annual subvention received from UNESCO via ICSU represents a valuable support of the scientific activities of URSI,

in particular for the organisation of international scientific symposia and other meetings of scientists and the issue of publications;

resolves to convey to UNESCO the thanks and appreciation of the Union for these subventions.

C.17. — Peruvian URSI Committee

The URSI Council,

noting

(*a*) the arrangements made in Lima for the scientific and administrative sessions of the XVIII General Assembly of URSI;

(*b*) the hospitality shown to the delegates and their families during the Assembly;

resolves to transmit its warmest thanks to the URSI Committee in Peru for the invitation to hold the Assembly in Lima, and for the first time in Latin America, and to the members of the Organising Committee who were concerned with the detailed arrangements and who spared no effort to ensure the success of the Assembly.

C.18. — XIX General Assembly of URSI

The URSI Council,

considering

(*a*) the invitations for the XIX General Assembly submitted by the Member Committees in Brazil, Finland, France, Israel and USSR;

(*b*) the result of the ballot;

resolves

1. to accept the invitation of the URSI Committee in Finland to hold the XIX General Assembly in Helsinki in 1978;

2. to express to all the Committees its appreciation of their kind invitations.

RESOLUTIONS AND RECOMMENDATIONS OF COMMISSIONS

COMMISSION I
ON RADIO MEASUREMENTS AND STANDARDS

I.1. — Use of Satellites for Distribution and High-precision Comparison of Time and Frequency

Commission I,

considering

(*a*) that frequency standards have been developed with an uncertainty of 10^{-13}, and instability of about 10^{-14}, and that further improvements are foreseen;

(*b*) that the associated time scales will therefore depart from uniformity by as little as 10 nanoseconds (ns) in one day;

(*c*) that the present uncertainty of time transfer using terrestrial radio links is not less than 100 ns;

(*d*) that satellite links offer the possibility of high-precision time transfer, in the range of 1 to 10 ns;

expresses the opinion that the full potential of existing standards can only be achieved by means of satellite time transfer;

recommends

1. that laboratories and observatories concerned with time-scale generation study the application of satellite techniques to the world-wide dissemination of precise time and frequency;

2. that they also associated themselves, by well-characterized terrestrial links, with the existing facilities for satellite communication or navigation leading to the conduct of experimental bilateral or multilateral time transfers;

3. that these laboratories and observatories also give all necessary and convenient assistance, in the time and frequency field, to the relevant programmes of the National Aeronautics and Space Agency (NASA) and the European Space Agency (ESA), particularly to those activities making use of the space shuttle and space laboratory;

4. that, where possible or practicable, Earth station facilities be provided

in close proximity to national time and frequency laboratories to facilitate direct time and frequency transfers by suitable satellite links;

5. that this Recommendation be transmitted to the organisations concerned (CCIR, NASA, ESA).

I.2. — Reception of Standard-Frequency and Time-Signal Transmissions

Commission I,

considering

(*a*) the increasing applications of standard-frequency and time transmissions for scientific and public use;

(*b*) that the development and an extended use of appropriate receiving devices in some countries is prejudiced by the need to obtain certification and to pay a fee;

expresses the opinion

1. that the reception of the emissions of standard-frequency and time-signal transmissions should be made permissible without the necessity of certification and fee payment;

2. that this Opinion should be brought to the attention of CCIR and, through the Member Committees of URSI, to the national telecommunications administrations.

I.3. — Support to Telecommunications Measurement Science

Commission I,

considering

(*a*) that the economies of the countries of the world are becoming increasingly dependent on the rapid transfer of information;

(*b*) that advances in telecommunication technology depend on accurate measurement of the characteristics of information being transmitted and of the physical means for information transfer;

(*c*) that many measurement methods related to telecommunication remain to be developed;

recommends that support be given to efforts to make available improved telecommunication measurement techniques for :

1. assuring the maximum utilization of the limited electromagnetic spectrum;

2. facilitating the development and use of new telecommunication systems which are capable of carrying quantities of information economically and which can conserve resources, including spectrum and energy;

3. increasing the reliability and interfacing capability of the growing digital communication systems.

I.4. — Telecommunication Measurements Working Group

Commission I,

considering the existing and growing concern of URSI with telecommunications science;

resolves to establish, in consultation with Member Committees of URSI, a Working Group to consider the importance of topics in telecommunication measurements in relation to the programme of Commission A and, in particular, to recommend which of these should be included in Commission A Symposia and General Assembly programmes;

requests the Member Committees of URSI to include in their membership, and in their delegations to General Assemblies of the Union, scientists who are expert in telecommunication measurements.

I.5. — Working Group on Measurements related to the Interaction of Electromagnetic Fields with Biological Systems

Commission I,

considering

(*a*) the growing concern with the biological effects of electromagnetic radiation, and URSI's interest in this interdisciplinary topic;

(*b*) the prior URSI efforts in this area, especially within the US National Committee;

(*c*) the need for the cooperation of physical scientists with biomedical organisations and scientists;

resolves

1. to reconstitute the Working Group on Electromagnetic Pollution as the Working Group on Measurements relating to the Interaction of Electromagnetic Fields with Biological Systems;

2. to direct the efforts of this Working Group towards (i) exploring and planning possible symposia that stress the measurement aspects of the interaction between electromagnetic radiation and biological systems; (ii) interfacing with other interested organizations in the development of such symposia; (iii) giving its active support to international organizations concerned with the health and safety aspects of the electromagnetic radiation environment.

I.6. — Working Group on Frequency and Time Metrology

Commission I,

considering

(*a*) the interest of Commission A in frequency standards, time scales, time and frequency metrology, time dissemination systems and related scientific topics;

(*b*) the considerable number of symposia in this area and the disadvantages that may result from lack of coordination between them;

(*c*) the need for carefully planned meetings for the direct interchange of information by specialists in these fields;

resolves

1. to establish a Working Group on Frequency and Time Metrology;

2. to request this Group to make recommendations on the organization or sponsorship by URSI of symposia or other meetings on these subjects and to study means of coordinating these meetings and those sponsored by other organizations.

I.7. — National Standard Laboratories

Commission I,

considering

(*a*) that the Working Group on the compilation of a list of standard laboratories had made substantial progress by distributing a Draft report dated July 1975 and that a first version of the list will be available for publication early in 1976;

(*b*) that it will be desirable later to complete the list by obtaining information from the remaining countries which adhere to URSI, and also to include in it information from other countries;

resolves

1. to express its appreciation of the work already done by Mr. A. E. Bailey and his colleagues;

2. to reconstitute the Working Group on National Standard Laboratories under the chairmanship of Mr. Bailey.

COMMISSION II ON RADIO AND NON-IONIZED MEDIA

II.1. — Symposia

Commission II,

recommends

1. that open URSI symposia be arranged during the period preceding the URSI Assembly in 1978 on the following topics :

A. Remote sensing of the lower atmosphere, and the Earth's surface and sub-surface,

B. Limitations on the performance of telecommunication systems due to propagation effects in the lower atmosphere;

2. that the invitation to hold these symposia in France during a 10-day period in the spring of 1977 be accepted.

COMMISSION III ON THE IONOSPHERE

III.1. — Changes in the Network of Ionospheric Stations

Commission III,

considering

(*a*) that the decision to set up or close down an ionospheric stations is mainly determined by national considerations which are paramount;

(*b*) that in some cases these decisions can be modified in the light of informed international advice;

(*c*) that the CCIR has expressed the opinion that the Ionospheric Network Advisory Group (INAG) should be consulted on the establishment or closure of stations (Opinion 22-2);

(*d*) that several administrations are considering the need for continued operation of their stations after the IMS (1976-1978);

(*e*) that it is difficult to make contact with the rapidly growing number of users of long sequences of ionospheric data, many of whom are not in touch with URSI;

(*f*) that some scientists have expressed concern about the small and decreasing number of long-established stations and the recent closure of stations in important locations for geophysical studies;

recommends that administrations which intend to review the operation of their ionospheric stations before 1978 be invited to inform INAG of the names of the stations involved and to say whether or not any decisions can be influenced by the international importance of the stations.

III.2. — Monitoring of Long-term Changes in the Ionosphere

Commission III,

considering

(*a*) that many of the ionosphere stations which have made long sequences (over 20 years) of observations have been closed;

(*b*) that representations have been made to URSI (INAG) requesting that this trend be stopped and, if possible, that some stations be reopened;

recommends that scientists who are interested in long sequences of ionospheric data be invited (i) to evaluate the potential value of maintaining each such station; (ii) to indicate which of the closed stations would, if reopened, be of unusual value to their research; (iii) to inform URSI (INAG) of their conclusions.

Note. — Each station must be evaluated separately, and the conclusions must indicate why a station at its particular location is valuable. INAG is unable to accept recommendations concerning groups of stations.

III.3. — New Ionosphere Stations

Commission III,

considering that there is an active interest in establishing vertical incidence ionosphere sounding stations at Adak (Alaska), Anchorage (Alaska), Ascension Island, Barter Island (Alaska), Easter Island, Gough Island (South Atlantic) and either Sitka or Juneau (Alaska);

resolves

1. to invite scientists interested in using data from any of these locations

to inform INAG during 1976 of their reasons for needing such data so that suitable priorities can be established;

2. to draw the attention of national administrations to the interest expressed at the URSI General Assembly in 1975 in the establishment of stations at these locations.

III.4. — URSI Handbook of Ionogram Interpretation and Reduction (High Latitude Supplement)

Commission III,

considering

(*a*) that the translation, in whole or in part, of the second edition of the *URSI Handbook of Ionogram Interpretation and Reduction* into the French, Finnish, Japanese, Russian and Spanish languages has been very effective in improving the operation of the network of vertical incidence sounding stations;

(*b*) that the value of the High Latitude Supplement to the Handbook would be similarly enhanced by translation;

resolves

1. to express its thanks to the national organisations responsible for these translations;

2. to recommend that the national organisations be invited to make every effort to arrange for the translation of the High Latitude Supplement at least into Japanese, Russian and Spanish.

III.5. — Training Programme

Commission III,

considering

(*a*) that the data from the network of vertical incidence ionosphere stations are being more extensively used by scientists not connected with the network as such;

(*b*) that the importance of uniform and accurate data is, therefore, increasing;

resolves

1. to draw the attention of administrators to the need for better training of the staff responsible for the operation of ionosphere stations and to the existence of special training symposia in several countries;

2. to offer the cooperation of INAG in coordinating and guiding such efforts;

3. to invite all groups organising training symposia to inform INAG about the proposed place and date, and about any difficulties disclosed during the symposium.

III.6. — Jicamarca Observatory

Commission III,

considering the distinguished scientific record of the Jicamarca Radio Observatory, in Peru, in studies of the equatorial ionosphere;

resolves

1. to commend the formation of the Jicamarca Users and Sponsors Association (JUSA), and

2. to invite Official Members of URSI Commission G to draw the attention of their colleagues and national administrations to the possibilities of undertaking research at Jicamarca on a fee-paying basis.

III.7. — Incoherent Scatter Sounding in Asia

Commission III,

considering

(*a*) that important parameters describing the ionosphere and the atmosphere can be obtained by using the incoherent scatter sounding technique;

(*b*) that there is no such sounder in the Asian region;

(*c*) that such a sounder would help to improve our understanding of the Earth's environment, and especially of the structure and dynamics of the middle and upper atmosphere;

resolves to urge scientists in the Asian sector to investigate the possibility of constructing an incoherent scatter sounding station in their region.

III.8. — Middle Atmosphere Programme

Commission III,

considering

(*a*) that the SCOSTEP programme on the Structure and Energetics of the Stratosphere and Mesosphere is being reformulated as the Middle Atmosphere Programme;

(*b*) that there will be a strong emphasis on remote sensing techniques when these have been fully developed;

recommends that URSI Commission G participate in the formulation of the new programme in collaboration with other interested bodies in ICSU.

III.9. — Indices for Predictions of Ionospheric Propagation

Commission III,

considering

(*a*) that in 1962 the ionospheric index IF_2 was recommended by CCIR for use in making ionospheric predictions;

(*b*) that this index necessitates the use of monthly mean values of foF_2 from 11 vertical incidence stations;

(*c*) that the reasons given in 1962 for preferring IF_2 to the solar noise flux (ø) at 2,800 MHz are no longer valid;

(*d*) that absolute measurements of ø can now be made with sufficient accuracy at one station located anywhere;

resolves

1. to draw the attention of CCIR Study Group 6 to the advances made in this field since 1962;

2. to recommend that consideration be given to the substitution of ø for IF_2.

III.10. — Working Groups

Commission III,

recommends that the following Working Groups be constituted or reconstituted, as appropriate, within Commission G :

G.1. *Ionospheric Network Advisory Group* (INAG).

Chairman : W.R. Piggott (UK); Vice-Chairman : J.V. Lincoln (USA).
To assist the ionosonde network stations and to serve as a means of communication between them and the scientific community.

G.2. *Ionospheric Drift Observations.*

Chairman : K. Sprenger (GDR); Vice-Chairman : A. Spizzichino (France).

To co-ordinate measurements of horizontal movements in the ionosphere.

G.3. *Ionospheric Absorption Measurements.*

Chairman : H. Schwentek (FRG); Vice-Chairman : K.M. Kotadia (India).

To co-ordinate measurements of ionospheric absorption.

G.4. *Data Processing in Ionospheric Research.*

Chairman : J.W. Wright (USA); Vice-Chairman : A. Haug (Norway).

To promote the exchange of information and international agreement on the optimum processing and exchange of ionospheric data.

G.5. *Southern Hemisphere Ionospheric Studies Group* (SHISG).

Co-Chairmen : J.A. Gledhill (South Africa), S.M. Radicella (Argentina).

To encourage and coordinate studies of the ionosphere and ionospheric communications in the southern hemisphere.

G.6. *Morphological Models of the Ionosphere.*

Chairman : K. Rawer (FRG).

To coordinate the development of numerical and analytical models of electron density and related parameters of the ionosphere.

G.6.1. *International Reference Ionosphere* (IRI).

Chairman : K. Rawer (FRG).

To develop, jointly with COSPAR, reference models of the vertical structure of the ionosphere.

G.6.2. *Complete Electron Density Profiles.*

Chairman : L.F. NcNamara (Australia).

To investigate methods of deriving complete electron density profiles.

G.6.3. *Ionospheric Mapping.*

Chairman : C.M. Rush (USA).

To investigate methods of constructing global maps of selected ionospheric parameters.

G.7. *Artificial Ionospheric Heating.*

Chairman : W.E. Gordon (USA); Vice-Chairman : W.F. Utlaut (USA).

To promote studies of the effects of artificial heating of the ionosphere and its communication aspects.

G.8. *Incoherent Scatter.*

Chairman : P. Bauer (France); Vice-Chairman : J.V. Evans (USA).

To exchange experimental and theoretical information on, and plan programmes using, the technique of incoherent scatter.

G.9. *Influence of the Ionosphere on Radio Systems.*

Chairman : J.W. King (UK).

G.9.1. *Propagation below 300 kHz as affected by the Ionosphere.*

Co-Chairmen : H.G. Booker (USA); T.B.Jones (UK).

To study all aspects of radio wave propagation at frequencies below 300 kHz which involve the ionosphere.

G.9.2. *Normal ionospheric propagation at frequencies above 300 kHz.*

Chairman : H.G. Moeller (FRG); Vice-Chairman : J.M. Kelso (USA).

To study all aspects of ground-to-ground ionospheric propagation by means of the normal layers at MF and HF.

G.9.3. *Abnormal ionospheric propagation associated with special ionospheric features.*

Chairman : C.G. McCue (Australia); Vice-Chairmen : I. Kasuya (Japan) and E.K. Smith (USA).

To study the effects of temporal and spatial features (e.g. sporadic-E, spread-F, electrojets, disturbances) on ground-to-ground propagation at frequencies above 300 kHz.

G.10. *Ionospheric Scattering and Scintillation.*

Chairman : J. Aarons (USA); Vice-Chairman : E.J. Fremouw (USA).

To study experimental and theoretical aspects of the scattering and diffraction of radio waves by irregularities.

Note : *See also Res. IV.2 (G-H Joint Working Group).*

III.11. — URSI/IUGG (IAGA) Inter-Union Working Groups

Commission III,

recommends that the following URSI/IUGG (IAGA) Inter-Union Working Groups be maintained, subject to the approval of IUGG (IAGA) :

1. *Structure and Dynamics of the Thermosphere, Ionosphere and Exosphere.*

Chairman : H. Rishbeth (UK); Vice-Chairmen : G. Kockarts (Belgium) and H. Kohl (FRG).

2. *Neutral and Ion Chemistry and Solar Fluxes.*
   Chairman : L. Thomas (UK); Vice-Chairmen : A.D. Danilov (USSR) and T. Tohmatsu (Japan).
3. *Stratosphere-Mesosphere-Ionosphere Interactions.*
   Chairman : J.B. Gregory (Canada); Vice-Chairmen : M. Ackerman (Belgium) and C.F. Sechrist (USA).

COMMISSION IV ON THE MAGNETOSPHERE

IV.1. — Terms of Reference of Commission H

Commission IV,

noting and approving the reorganisation of URSI as decided by the URSI Council, and the title "Waves in plasmas" proposed for Commission H;

considering that it is desirable to distinguish clearly between those parts of the study of wave phenomena in natural plasmas associated on the one hand with geophysics, and on the other with radiophysics;

recommends that Commission H take immediate steps to define its terms of reference in relation to the study of the specific characteristics of wave phenomena in plasmas.

IV.2. — Working Groups

Commission IV,

recommends that Working Groups be formed by URSI Commission H to study the following topics :

H1. Plasma instabilities (jointly with Commission G) : J.A. Fejer and D.T. Farley;
H2. Antennae in plasmas (jointly with Commission B) : R.W. Fredricks;
H3. Wave analysis (jointly with Commission C) : D. Jones and J.L. Lacoume;
H4. Radiofrequency plasma devices : F.W. Perkins;
H5. Active experiments : F.L. Scarf.

IV.3. — Inter-Union Working Groups

Commission IV,

considering

a) the orientation of Commission H as defined in Res. IV.1;

b) the need to maintain close contacts with IAGA when dealing with subjects of common interest;

c) the valuable work carried out by the URSI-IAGA Working Group on the auroral oval and its extension in space;

expresses its thanks to the co-chairmen of this Working Group, C.T. Russell and B. Hultquist, for the work accomplished;

recommends

1. the termination of the URSI-IAGA Working Groups on the physics of the plasmapause and on the auroral oval and its extension into space;
2. the creation of two new URSI-IAGA Working Groups on
   (1) Wave instabilities in space plasmas (with F.L. Scarf and D. Papadopoulos as co-chairmen for URSI);
   (2) Probing the magnetosphere by means of whistlers and magnetic pulsations (with D. Carpenter as chairman for URSI) (in common with Commission G).

IV.4. — Automated Treatment of Data

Commission IV,

considering

a) that passive and active VLF probing experiments can make an important contribution to studies of the magnetosphere during the IMS;

b) that rapid processing and timely intercomparison of data from spaced stations and from new instruments will be an important factor in realizing the scientific potential of the anticipated measurements;

recommends that VLF groups individually, and where appropriate jointly, develop and employ automated techniques for the key phases of data acquisition and processing.

IV.5. — Symposia

Commission IV,

recommends

1. that URSI agree to cosponsor the COSPAR Symposium, in 1976, on Active experiments in space plasmas, and that C.T. Russell be designated as the URSI representative on the Programme Committee;

2. that URSI agree to cosponsor the Regional Symposium on the Magnetosphere and its Environment, to be held in Christchurch, New Zealand in January 1977, provided that the programme will include topics associated with waves in ionized media;

3. that URSI Commissions B, C, F, G and H organise a joint Symposium, at the XIX General Assembly (Helsinki, 1978) on the following topic : Remote sensing of inhomogeneous structures in the Earth's Environment, as proposed by M. Crochet.

COMMISSION V ON RADIO ASTRONOMY

V.1. — Intercontinental Radiotelescope Array

Commission V,

considering

a) that a radiotelescope array capable of a resolution of less than 1 milliarcsecond is desired for the study of the compact radio sources found in quasars, galactic nuclei, interstellar molecular masers, pulsars and radio stars, as well as for use in a variety of geophysical and geodetic projects;

(*b*) that such an array would have global dimensions, with elements located in several countries;

(*c*) that it may be appropriate, therefore, to construct and operate such an instrument as an international facility;

resolves that URSI Commission J give further study to the feasibility of such a project.

V.2. — Dynamic Range of Radiotelescope Systems

Commission V,

considering that tentative proposals have been made in the Netherlands

for a working meeting, to be held in 1976 or 1977, on the dynamic range of radiotelescope systems;

recommends that the possibility of URSI cosponsorship of this meeting be examined.

V.3. — Galactic and Extra-galactic Infra-red and Sub-mm Astronomy

Commission V,

considering that COSPAR has invited URSI to cosponsor a Symposium in Philadelphia in 1976 on Galactic and extra-galactic infra-red and sub-mm astronomy;

recommends that this invitation be accepted and that Prof. A.H. Barrett should represent URSI in the planning of the Symposium.

COMMISSION VI ON RADIO WAVES AND CIRCUITS

VI.1. — Symposia and other meetings 1976-1978

Commission VI,

considering

(*a*) that the following events cover fields of interest to URSI :

(1) Symposium on Information Theory, Rönnby, Sweden 1976.

(2) Summer School on Circuit Theory, Prague 1977.

(3) Symposium on Electromagnetic Theory, near San Francisco, 1977.

(4) Symposium on Electromagnetic Compatibility, 1977.

(5) Eurocon, Venice 1977.

(6) Colloquium on Microwave Communication, Budapest 1978;

recommends that the possibility of URSI cosponsorship of some or all of these events be examined.

COMMISSION VII ON RADIO ELECTRONICS

VII.1. — Symposium on Optical Devices

Commission VII,

considering that the duration of a General Assembly of URSI is already fairly long, and that it is undesirable to extend the duration by holding an open symposium before the Assembly;

recommends

1. that URSI Commission D organise a one-day open symposium within the working period of the Assembly in 1978;

2. that the topic be optical devices for telecommunications systems and for frequency mixing or multiplication;

3. that consideration be given to the possibility of organising this Symposium jointly with Commissions A, B and C.

VII.2. — Interdisciplinary Contacts

Commission VII,

considering

(*a*) that the scientific sessions of the Commissions at URSI General Assemblies cover a wide range of subjects all related to some aspect of telecommunications;

(*b*) that these sessions can provide valuable opportunities for delegates to make interdisciplinary contacts;

recommends

1. that the details concerning the authors and the titles of the papers to be presented in all the Commissions, and the timing of the sessions, be finalised well before the Assembly;

2. that a detailed programme be made available to every delegate when he registers.

Note : *This Recommendation should be submitted to the Board of Officers.*

COMMISSION VIII
ON RADIO NOISE OF TERRESTRIAL ORIGIN

VIII.1. — Symposia and other meetings

Commission VIII,

considering the field of study allocated to URSI Commission E;

recommends

1. that consideration be given to the cosponsorship by URSI of the following proposed events :

   1.1. a meeting on the global location of atmospherics (at present being discussed in the Federal Republic of Germany);

   1.2. a meeting on the recording of local lightning flashes (to be held in Uppsala, Sweden);

2. that Commission E consider the possibility of organising meetings on some of the following topics :

   2.1. Atmospherics (in about 1978) possibly in cooperation with the IAMAP Commission on Atmospheric Electricity;

   2.2. Lightning flash counters;

   2.3. Solar-cycle variations in noise interference;

   2.4. Natural noise in space (possibly in cooperation with Commission H).

RÉSOLUTIONS ET RECOMMANDATIONS DU CONSEIL

C.1. — Réorganisation de l'URSI

Le Conseil de l'URSI,

décide

1. d'ajouter le paragraphe suivant aux Buts de l'URSI, tels que formulés à l'Article 1 des Statuts :

« *c*) de stimuler et de coordonner les études des aspects scientifiques » des télécommunications utilisant les ondes électromagnétiques guidées » et non guidées »;

2. de concentrer les activités de l'Union sur les sujets figurant à l'Annexe 1 et de réviser la liste de ces sujets à l'occasion de chaque Assemblée générale;

3. d'adopter à l'issue de la XVIII[e] Assemblée générale la structure donnée à l'Annexe 2 pour les Commissions;

4. de conférer, dans les activités scientifiques futures de l'URSI, une place de première importance à l'organisation de colloques pleinement ouverts à tous les scientifiques intéressés;

5. d'inviter chaque Commission, à l'occasion de chaque Assemblée générale et dans le cadre de ses activités et de son mandat, à proposer au Conseil un sujet pour un colloque ouvert qui se tiendrait avant la fin de l'Assemblée générale suivante, et à présenter ses suggestions concernant le choix des membres du Comité du programme de ce colloque;

6. d'autoriser le Bureau *a*) à désigner le Président du Comité du programme de chaque Colloque, *b*) à décider lesquels de ces colloques auront lieu à l'occasion de l'Assemblée générale suivante, en se conformant à la règle générale que les colloques présentant le plus large intérêt devraient se tenir dans le cadre de l'Assemblée;

7. d'inviter instamment les Comités Membres de l'Union à mobiliser dans leur pays tous ceux qui sont intéressés par la science des radiocommunications, et à faire en sorte que leurs efforts dans ce sens se reflètent sur le plan international dans les colloques ouverts que l'URSI organise pendant ou entre ses Assemblées générales;

8. d'autoriser le Président de l'Union à engager des discussions avec les organisations nationales et internationales intéressées par les télécommunications (y compris la télédétection et les communications optiques) pour explorer les possibilités de collaboration avec ces organisations;

9. *a*) d'inviter les organisations intéressées par la tenue de colloques internationaux sur les différents aspects des télécommunications à collaborer à la mise en place d'un arrangement qui permettrait d'échelonner les colloques à des dates convenues et d'éviter les doubles emplois, ce qui assurerait une programmation internationale véritable;

b) de rechercher les voies pour établir un organe de coordination permanent permettant la réalisation de ce projet et d'assurer la publication régulière et fréquente de la liste des colloques dont l'organisation aura été convenue, et cela pour plusieurs années à l'avance;

10. de modifier les Statuts de l'URSI de manière à éliminer toutes références, réelles ou impliquées, qui pourraient être interprétées comme impo-

sant des restrictions à la participation aux conférences scientifiques de l'Union.

ANNEXE 1. — *Sujets recommandés*

a) Méthodes de mesure électromagnétique, y compris les étalons radioélectriques et les interactions biologiques.

b) Théorie électromagnétique, y compris les antennes et les guides d'ondes.

c) Développements scientifiques dans le domaine des dispositifs destinés aux télécommunications, y compris la radioélectronique et les sources hyperfréquences.

d) Théorie de l'information, problèmes de fluctuation statistique, traitement du signal et exploitation des ordinateurs.

e) Systèmes de communication et théorie des systèmes, y compris les circuits.

f) Environnement du point de vue des bruits et des brouillages électromagnétiques.

g) Télédétection.

h) Radioastronomie.

i) Phénomènes ondulatoires dans les milieux non ionisés, y compris la radiométéorologie et la radio-océanographie.

j) Phénomènes ondulatoires dans les milieux ionisés, en particulier dans l'environnement ionisé de la Terre, y compris les sondages ionosphériques et les radiocommunications (en ce qui concerne la géophysique des milieux ionisés, les aspects qui ne sont pas étroitement apparentés aux phénomènes ondulatoires seront exclus).

k) Application de la science des télécommunications aux problèmes de l'UIT, par l'intermédiaire du CCIR et du CCITT.

l) Enseignement de la science des télécommunications (théorie et pratique).

ANNEXE 2. — *Commissions de l'URSI*

Lettre d'identification	*Titre*
A	*Métrologie électromagnétique* (y compris les étalons radioélectriques et les interactions biologiques).
B	*Ondes et champs.* Théorie et applications de l'électromagnétisme (y compris les antennes et les guides d'ondes).

Lettre d'identification	*Titre*
C	*Signaux et systèmes.* Systèmes de communication et théorie des systèmes (y compris les circuits); théorie de l'information et traitement du signal (y compris les problèmes de fluctuation).
D	*Electronique physique* et dispositifs.
E	*Environnement du point de vue des brouillages* électromagnétiques.
F	*Phénomènes ondulatoires dans les milieux non ionisés* (y compris la radiométéorologie, la radio-océanographie et la télédétection des milieux non ionisés).
G	*Radioélectricité ionosphérique et propagation* (y compris les communications ionosphériques et la télédétection des milieux ionisés).
H	*Ondes dans les plasmas.*
J	*Radioastronomie* (y compris la télédétection des corps célestes).

Notes :

1) Les Commissions A, D, E, F et J correspondent respectivement aux Commissions I, VII, VIII, II et V avec, dans la plupart des cas, une légère expansion du domaine d'intérêt.

2) Les Commissions B et C couvrent le domaine d'intérêt de la Commission VI.

3) Les Commissions G et H couvrent les domaines d'intérêt des Commissions III et IV. Les aspects théoriques de la propagation des ondes radioélectriques dans les milieux ionisés sont couverts par la Commission H cependant que les aspects liés aux communications sont couverts par la Commission G.

4) Il n'a pas été estimé nécessaire de créer des Commissions pour s'occuper de la collaboration avec l'UIT (CCIR et CCITT) et de l'enseignement de la science des télécommunications, puisque ces sujets concernent plusieurs Commissions, mais il a été convenu de former :

a) un Comité commun URSI-UIT (comprenant des représentants des Commissions d'études du CCIR et du CCITT) qui serait chargé d'assurer un maximum de collaboration entre l'URSI et l'UIT;

b) un Comité de l'URSI pour l'enseignement de l'électromagnétisme et de la science des télécommunications.

5) Les interactions entre les champs radioélectriques et les tissus biologiques intéressent plusieurs Commissions.

C.2. — Approbation des comptes 1972-1974

Le Conseil de l'URSI,

ayant pris connaissance du Rapport du Comité des finances daté du 13 août 1975,

décide d'approuver les comptes de l'Union apurés pour les années prenant fin au 31 décembre 1972, 1973 et 1974.

C.3. — Unité de contribution annuelle et budget 1976-1978

Le Conseil de l'URSI,

considérant qu'il est nécessaire de réduire les frais de voyage et autres, entraînés par les Assemblées générales,

décide

1. d'autoriser le paiement des frais de voyage aux Assemblées uniquement dans les cas du Président de l'Union, du Secrétaire général et de la Secrétaire administrative;

2. d'établir un Fonds de secours pour les Assemblées, qui ne sera utilisé que dans les cas où un membre du Bureau, ou bien un Président de Commission, ne pourrait pas se faire rembourser la totalité de ses frais de déplacement par le Comité Membre auquel il appartient;

3. d'adopter les unités de contribution annuelle suivantes :

1976	300 dollars des Etats-Unis
1977	350 dollars
1978	400 dollars;

4. d'autoriser le Président du Comité des finances à établir le budget définitif pour les années 1976, 1977 et 1978.

C.4. — Publications

Le Conseil de l'URSI,

ayant pris connaissance du Rapport du Comité des Publications daté du 12 août 1975,

décide

1. d'accepter les recommandations formulées dans ce Rapport;

2. d'adopter la proposition selon laquelle la prochaine édition de « Review of Radio Science » couvrira la période 1975-1977 et sera publiée en juillet 1978.

C.5. — Colloques et Groupes de travail

Le Conseil de l'URSI,

considérant

a) que l'organisation et le copatronage par l'URSI de colloques ouverts représentera un aspect important des activités de l'Union pendant la période 1976-1978;

b) que, pendant la XVIII[e] Assemblée générale, le manque de temps ne lui a pas permis de procéder à l'étude approfondie des propositions faites par les Commissions concernant l'organisation de colloques;

c) que les propositions concernant la création de Groupes de travail par les Commissions ne lui sont pas toutes parvenues avant la fin de l'Assemblée,

décide

1. de demander au Bureau d'examiner les propositions relatives aux colloques et aux Groupes de travail des Commissions, ainsi que leurs implications financières;

2. d'autoriser le Bureau à prendre les décisions nécessaires concernant l'organisation de ces colloques et, dans les cas appropriés, la formation et les activités des Groupes de travail pendant la période 1976-1978.

C.6. — Comité permanent pour les Assemblées générales de l'URSI

Le Conseil de l'URSI,

considérant que le Comité permanent pour les Assemblées générales de l'URSI a rempli sa mission avec succès en obtenant des invitations pour les Assemblées de 1978 et 1981,

décide

1. d'exprimer ses remerciements au Comité pour sa diligence;

2. de renouveler son mandat, avec mission de présenter au Conseil,

lors de la XIX[e] Assemblée générale, un rapport sur les invitations pour les Assemblées de 1981 et 1984.

C.7. — Comité permanent pour la participation a l'URSI

Le Conseil de l'URSI,

considérant qu'il est souhaitable d'encourager l'adhésion de nouveaux Comités Membres à l'Union,

décide

1. d'établir un Comité permanent pour la participation à l'URSI, composé des membres suivants :

Prof. O. Awe (Nigéria) : Afrique,
Prof. K. Géher (Hongrie) : Europe,
D[r] A. Giesecke (Pérou) : Amérique latine,
Prof. S. Okamura (Japon) : Asie;

2. de donner pour mission au Comité de proposer des moyens propres à porter les activités de l'URSI à l'attention des scientifiques radioélectriciens dans les territoires où il n'y a pas de Comité Membre de l'URSI et de présenter ses recommandations au Bureau de l'Union.

C.8. — Comité URSI-UIT

Le Conseil de l'URSI,

considérant

a) que suite à sa réorganisation l'URSI procédera à une réorientation de ses activités et accordera une attention plus prononcée aux radiocommunications;

b) qu'il est souhaitable que des relations plus étroites unissent l'URSI et l'UIT,

donne instruction au Bureau de consulter l'UIT sur la possibilité de créer un Comité commun URSI-UIT, dont seraient membres les Présidents des Commissions de l'URSI et des Commissions d'études du CCIR et du CCITT appropriées.

C.9. — Relations avec le CIUS

Le Conseil de l'URSI,

considérant

a) qu'au sein de l'Assemblée générale du Conseil International des Unions Scientifiques (CIUS), les Unions scientifiques internationales et les Académies des Sciences nationales disposent d'un nombre de voix pratiquement égal;

b) que de sérieuses divergences pourraient se manifester entre, d'une part, les vues exprimées par les Académies des Sciences et, de l'autre, celles exprimées par les Unions scientifiques,

donne instruction au Bureau de procéder à un examen approfondi de la position des Unions vis-à-vis du CIUS et de lui soumettre ses conclusions lors de la XIX^{e} Assemblée générale.

C.10. — IUCAF

Le Conseil de l'URSI,

considérant

a) que la Conférence administrative mondiale des radiocommunications (CAMR), convoquée pour 1979, étudiera les questions concernant les besoins techniques et les attributions de fréquence pour tous les services radioélectriques, y compris l'utilisation de fréquences radioélectriques pour la recherche scientifique;

b) que les décisions prises par cette Conférence resteront probablement en vigueur pendant une vingtaine d'années;

c) que les délibérations et recommandations de la Commission inter-Unions pour l'attribution de fréquences à la radioastronomie et à la science spatiale (IUCAF) constituent le moyen approprié pour exprimer les besoins de la recherche scientifique en fréquences radioélectriques;

d) que les administrations nationales effectuent actuellement leurs préparatifs en vue de la Conférence de 1979,

décide d'encourager l'IUCAF

a) à entreprendre en temps opportun ses délibérations et études pour déterminer les besoins des scientifiques radioélectriciens concernant l'utilisation du spectre radioélectrique;

2. à porter ses recommandations à l'attention des membres de l'URSI, de l'UAI et du COSPAR pour commentaires;

3. à inviter les administrations nationales à inclure, si elles le considèrent opportun, les recommandations de l'IUCAF aux documents qu'elles présenteront au CCIR et à la Conférence administrative mondiale des radiocommunications de 1979.

C.11. — IUCRM — Radio-océanographie

Le Conseil de l'URSI,

considérant

a) que la radio-océanographie constitue un nouveau champ de recherches en pleine expansion qui intéresse la radioélectricité scientifique;

b) qu'elle a déjà eu un impact considérable dans le domaine de l'océanographie physique,

recommande

1. que, sous réserve de ratification par l'UGGI [1], la Commission inter-Unions de Radiométéorologie (IUCRM) apporte à sa Constitution et à sa composition les modifications nécessaires pour inclure la radio-océanographie à son mandat, tout au moins jusqu'à l'Assemblée générale de l'URSI en 1978;

2. que le paragraphe *a*) de l'Article 1 de la Constitution de l'IUCRM soit modifié comme suit : « de promouvoir l'étude des facteurs météorologiques » et océanographiques qui affectent la propagation des ondes électro- » magnétiques dans l'atmosphère terrestre et sur la surface du globe, ainsi » que dans les atmosphères planétaires »;

3. que l'URSI et l'UGGI étudient la possibilité de former une Commission inter-Unions de radio-océanographie lorsque ce domaine aura acquis une reconnaissance internationale plus large.

C.12. — IUCRM — Composition

Le Conseil de l'URSI,

considérant

a) qu'il est souhaitable de renouveler les membres de la Commission inter-Unions de Radiométéorologie (IUCRM) à des dates bien déterminées;

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[1] Au cours de son Assemblée générale (Grenoble, 25 août-6 septembre 1975), l'UGGI a accepté cette recommandation.

b) que les règles qui régissent la convocation par l'IUCRM de ses réunions demandent à être clarifiées,

recommande que, sous réserve de ratification par l'UGGI (1), les Articles 3, 4 et 7 de la Constitution de l'IUCRM soient modifiés comme suit :

1. « Art. 3 — Les membres de la Commission sont au nombre de douze, » six proposés par l'UGGI et six par l'URSI. Chacune de ces deux Unions » nomme ses représentants pour une période de six années, et remplace » tous les trois ans la moitié de ses représentants. Les désignations se font » suffisamment à temps de manière à ce qu'elles deviennent définitives » à la fin de chaque Assemblée générale de l'URSI »;

2. « Art. 4 — Le Président et le Secrétaire de la Commission sont élus » par les membres pour une période de trois ans, les deux ne représentant » pas la même Union. L'élection a lieu dans une période de trois mois » après la fin de chaque Assemblée générale de l'URSI. Le Président et le » Secrétaire sont rééligibles, mais ne peuvent normalement remplir plus de » deux mandats consécutifs »;

3. « Art. 7 — La Commission se réunira au moins une fois au cours » de son mandat et, si possible, en même temps qu'une Assemblée générale » de l'URSI ou de l'UGGI, après accord entre ces deux Unions. De plus, » la Commission est autorisée à se réunir à tout moment, chaque fois que » des problèmes relevant de ses attributions rendent une telle réunion » nécessaire.

» La Commission est encouragée à organiser des colloques à d'autres » moments pourvu que l'Union-mère ait approuvé les dispositions finan- » cières prises ».

C.13. — IUCRM — Programme

Le Conseil de l'URSI,

considérant

a) que la Commission II de l'URSI a relevé les sujets suivants comme particulièrement appropriés pour être traités dans des colloques de l'IUCRM:
A. Etudes de la couche limite.
B. Radio-océanographie.

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(1) Au cours de son Assemblée générale (Grenoble, 25 août–6 septembre 1975), l'UGGI a accepté cette recommandation.

C. Spectroscopie millimétrique et sub-millimétrique des constituants de l'atmosphère.
D. Détection par radiométrie (passive).
E. Structure fine de l'atmosphère (mais en insistant sur des aspects différents de ceux des colloques antérieurs).
F. Précipitations — structure et effets (prolongement du colloque de Nice);

b) qu'elle considère les sujets B et A comme présentant la plus grande importance (suivant cet ordre de priorité),

recommande

1. de porter ces sujets à l'attention de l'UGGI et de l'IUCRM;

2. d'organiser un colloque sur la radio-océanographie, à condition que l'UGGI accepte l'inclusion de ce sujet au mandat de l'IUCRM (1).

C.14. — IUCRM — Représentants de l'URSI

Le Conseil de l'URSI,

ayant pris note de la recommandation de la Commission II de l'URSI,
décide

1. de désigner les personnalités suivantes comme représentants de l'URSI au sein de l'IUCRM : J.R. Apel (EUA), K. Browning (R-U), P. Gudmandsen (Danemark), Ya. Melnichuk (URSS), Ph. Waldteufel (France) et S. Wickerts (Suède);

2. d'adresser ses félicitations à l'IUCRM pour les excellents résultats obtenus au cours des trois années écoulées.

C.15. — Ionosphère de Référence Internationale (IRI)

Le Conseil de l'URSI,

notant

a) que le Prof. Rawer avait été invité à organiser la compilation d'une Ionosphère de Référence Internationale (IRI);

b) qu'un rapport intitulé « Preliminary Reference Profiles proposed for the International Reference Ionosphere » a été préparé par K. Rawer, S. Ramakrishna et D. Bilitza (Scientific Report WB2 de l'Institut für

(1) Au cours de son Assemblée générale (Grenoble, 25 août-6 septembre 1975), l'UGGI a accepté cette recommandation.

physikalische Weltraumforschung, Freiburg, République fédérale d'Allemagne, juillet 1975),

décide

1. d'adresser ses félicitations au Prof. Rawer et à ses collaborateurs pour le succès avec lequel ils ont rempli cette tâche difficile;

2. d'autoriser le Bureau à prendre les arrangements nécessaires pour publier certaines parties du Rapport sus-mentionné.

C.16. — Subvention de l'UNESCO

Le Conseil de l'URSI,

considérant que par la subvention annuelle qu'elle accorde à l'URSI, par l'intermédiaire du CIUS, l'UNESCO fournit un appui précieux pour les activités scientifiques de l'Union, en particulier pour l'organisation de colloques scientifiques internationaux et d'autres conférences scientifiques, ainsi que pour la production de publications,

décide d'exprimer à l'UNESCO la vive gratitude de l'Union pour ces subventions.

C.17. — Comité péruvien de l'URSI

Le Conseil de l'URSI,

notant

a) les dispositions prises à Lima pour les séances scientifiques et administratives de la XVIII[e] Assemblée générale de l'URSI;

b) l'accueil chaleureux qui a été réservé aux délégués et aux membres de leurs familles pendant l'Assemblée,

décide d'exprimer ses plus vifs remerciements au Comité péruvien de l'URSI pour l'invitation adressée à l'Union de tenir son Assemblée à Lima, et pour la première fois en Amérique latine, ainsi qu'aux membres du Comité organisateur, qui n'ont pas ménagé leurs efforts en vue de la réussite de l'Assemblée.

C.18. — XIXe Assemblée générale

Le Conseil de l'URSI,

considérant

a) les invitations présentées par les Comités Membres du Brésil, de France, de Finlande, d'Israel et de l'URSS pour l'organisation de la XIXe Assemblée générale;

b) le résultat du vote qui a eu lieu en son sein,

décide

1. d'accepter l'invitation du Comité finlandais de l'URSI de tenir la XIXe Assemblée générale à Helsinki en 1978;

2. d'exprimer aux Comités Membres précités ses vifs remerciements pour leurs aimables invitations.

RÉSOLUTIONS ET RECOMMANDATIONS DES COMMISSIONS

COMMISSION I
MESURES ET ÉTALONS RADIOÉLECTRIQUES

I.1. — Utilisation de satellites pour la diffusion et la comparaison de grande précision du temps et des fréquences

La Commission I,

considérant

a) que, dans le domaine des fréquences étalon, les résultats actuels se traduisent par une incertitude de 10^{-13} et une instabilité de 10^{-14}, et que de nouvelles améliorations sont prévues;

b) que, par conséquent, les échelles de temps associées ne s'écarteront de l'uniformité qu'à raison de 10 nanosecondes (ns) par jour;

c) que, pour le transfert du temps par liaisons radioélectriques terrestres, l'incertitude actuelle n'est pas inférieure à 100 ns;

d) que les communications par satellites offrent la possibilité de transférer le temps avec une grande précision, allant de 1 à 10 ns;

exprime l'opinion que seule l'utilisation de satellites pour le transfert du temps peut permettre la pleine exploitation des étalons existants,

recommande

1. que les laboratoires et observatoires qui produisent les échelles de temps étudient la possibilité de diffuser mondialement le temps et les fréquences de précision au moyen de satellites;

2. qu'ils s'intègrent, au moyen de liaisons terrestres à caractéristiques bien définies, aux systèmes existants de communication ou de navigation par satellites pour réaliser expérimentalement des transferts du temps sur base bilatérale ou multilatérale;

3. que, de plus, ces laboratoires et observatoires fournissent à l'Agence américaine pour l'aéronautique et l'espace (NASA) et à l'Agence spatiale européenne (ASE-ESA) toute l'assistance nécessaire dans le domaine du temps et des fréquences pour la mise en œuvre de leurs programmes et, plus particulièrement, de ceux qui font appel à la navette spatiale ou au laboratoire spatial;

4. que, dans la mesure du possible, des stations terriennes soient installées à proximité des laboratoires nationaux de temps et de fréquence pour faciliter le transfert direct du temps et des fréquences au moyen de liaisons par satellite appropriées;

5. que la présente Recommandation soit portée à la connaissance des organisations intéressées (CCIR, NASA, ASE/ESA).

I.2. — Réception des émissions de fréquences étalon et de signaux horaires

La Commission I,

considérant

a) que les émissions de fréquences étalon et de signaux horaires sont de plus en plus utilisées à des fins scientifiques et publiques;

b) que, dans certains pays, la nécessité d'obtenir un permis et de payer une taxe limite le développement et le plein usage des installations de réception appropriées,

exprime l'opinion que la réception des émissions de fréquences étalon et de signaux horaires devrait être exemptée de permis et de taxe et que cette opinion devrait être portée à la connaissance de l'organisation internationale compétente (CCIR) et, par l'intermédiaire des Comités Membres de l'URSI, des administrations nationales de télécommunication.

I.3. — Encouragement des mesures relatives aux télécommunications

La Commission I,

considérant

a) que les économies des pays du monde dépendent de plus en plus de la rapidité de la transmission de l'information;

b) que les progrès de la technologie des télécommunications dépendent de la mesure précise des caractéristiques de l'information transmise et du support physique utilisé pour la transmission;

c) que de nombreuses méthodes de mesure relatives aux télécommunications doivent encore être mises au point,

recommande que soient encouragés les efforts tendant à la mise au point et à l'amélioration des techniques de mesure relatives aux télécommunications dans le but :

1. d'assurer l'utilisation maximale du spectre électromagnétique qui est limité;

2. de faciliter le développement et l'utilisation de systèmes de télécommunications nouveaux capables de transporter de grandes quantités d'information de manière économique tout en préservant les ressources, y compris le spectre et l'énergie;

3. d'augmenter la fiabilité et la capacité d'interconnexion des systèmes de communication numérique dont le nombre ne cesse de croître.

I.4. — Groupe de travail sur les mesures relatives aux télécommunications

La Commission I,

considérant l'intérêt croissant de l'URSI pour la science des télécommunications,

décide d'établir, en consultation avec les Comités Membres de l'URSI, un Groupe de travail ayant pour mission d'examiner, dans le contexte de la Commission A, l'importance et l'ordre de priorité des différentes mesures relatives aux télécommunications et, en particulier, des sujets à inclure aux programmes des Assemblées générales de l'URSI et des colloques de la Commission A, et

demande aux Comités Membres de l'URSI de grouper en leur sein et

d'inclure dans leurs délégations aux Assemblées générales de l'URSI des spécialistes des mesures relatives aux télécommunications.

I.5. — GROUPE DE TRAVAIL SUR LES MESURES RELATIVES A L'INTERACTION ENTRE LES CHAMPS ÉLECTROMAGNÉTIQUES ET LES SYSTÈMES BIOLOGIQUES

La Commission I,

considérant

a) l'intérêt croissant pour les effets biologiques du rayonnement électromagnétique ainsi que l'intérêt de l'URSI pour ce sujet interdisciplinaire;

b) les efforts déjà faits dans ce domaine par l'URSI et, plus spécialement, au sein du Comité national des Etats-Unis d'Amérique;

c) la nécessité, pour les physiciens, de collaborer avec les organisations biomédicales et les scientifiques de ce domaine,

décide

1. de renouveler le mandat du Groupe de travail sur la pollution électromagnétique, sous la dénomination nouvelle de Groupe de travail sur les mesures relatives à l'interaction entre les champs électromagnétiques et les systèmes biologiques;

2. de donner à ce Groupe de travail les directives suivantes : (i) étudier la possibilité d'organiser des colloques qui mettraient en évidence les problèmes de la mesure de l'interaction entre le rayonnement électromagnétique et les systèmes biologiques, et établir des plans dans ce sens; (ii) collaborer avec les autres organisations intéressées dans l'organisation de tels colloques; (iii) fournir un soutien actif aux organisations internationales concernées par les problèmes de la santé et de la sécurité vis-à-vis des rayonnements électromagnétiques.

I.6. — GROUPE DE TRAVAIL SUR LA MESURE DU TEMPS ET DES FRÉQUENCES

La Commission I,

considérant

a) l'intérêt de la Commission A pour les étalons de fréquence, les échelles de temps, la mesure du temps et des fréquences, les systèmes de diffusion du temps et les sujets scientifiques apparentés;

b) le nombre considérable de colloques organisés dans ce domaine et

les inconvénients qui pourraient découler d'un manque de coordination dans leur programmation;

c) la nécessité de tenir des conférences soigneusement planifiées en vue de l'échange direct de données entre les spécialistes en la matière,

décide

1. d'établir un Groupe de travail sur la mesure du temps et des fréquences;

2. de lui donner pour mission de formuler des recommandations en vue de l'organisation ou du patronage par l'URSI de colloques ou autres réunions consacrés à ces sujets, et d'étudier les moyens propres à coordonner ces réunions avec celles d'autres organisations.

I.7. — Laboratoires nationaux d'étalons

La Commission I,

considérant

a) que, par la distribution de son Projet de rapport daté de juillet 1975, le Groupe de travail chargé de la compilation d'une liste des laboratoires responsables des mesures et des étalons a sérieusement progressé dans sa tâche, et qu'il envisage la publication d'une première version de la liste au début de 1976;

b) qu'il sera ultérieurement souhaitable de compléter cette liste par les données des pays membres de l'URSI qui ne les ont pas encore fournies ainsi que par les données des pays non membres de l'Union,

décide

1. d'adresser ses félicitations à M. A.E. Bailey et à ses collègues pour le travail qu'ils ont accompli;

2. de renouveler le mandat du Groupe de travail sur les Laboratoires nationaux d'étalons, sous la présidence de M. Bailey.

COMMISSION II
RADIOÉLECTRICITÉ ET MILIEUX NON IONISÉS

II.1. — Colloques

La Commission II

recommande

1. que des colloques ouverts soient organisés dans la période précédant l'Assemblée générale de l'URSI en 1978 avec, pour thèmes, les sujets suivants :

A. Télédétection de la basse atmosphère, de la surface et du sous-sol de la Terre,

B. Limitations imposées aux caractéristiques des systèmes de télécommunication par les effets de propagation dans la basse atmosphère;

2. que l'invitation de tenir ces Colloques en France au printemps de 1977 et sur une période de 10 jours soit acceptée.

COMMISSION III. — IONOSPHÈRE

III.1. — Changements dans le réseau des stations ionosphériques

La Commission III,

considérant

a) que la décision d'ouvrir ou de fermer une station ionosphérique dépend surtout de considérations d'ordre national qui s'avèrent déterminantes;

b) que, dans certains cas, des avis compétents émanant d'organismes internationaux seraient susceptibles d'influencer cette décision;

c) que le CCIR a exprimé l'opinion que le Groupe Conseil du Réseau Ionosphérique (INAG) devrait être consulté sur l'ouverture ou la fermeture des stations ionosphériques (Vœu 22-2);

d) que plusieurs administrations s'interrogent actuellement sur la nécessité de maintenir leurs stations en fonctionnement après la fin de l'Etude Magnétosphérique Internationale (IMS) (1976-1978);

e) qu'il est difficile de prendre contact avec les usagers de longues séquences de données ionosphériques dont le nombre va croissant et qui ne sont pas toujours en rapport avec l'URSI;

f) que certains scientifiques ont exprimé leur inquiétude devant la réduction continue du nombre des stations qui opèrent depuis longtemps et la récente fermeture de stations situées en des lieux importants du point de vue des études géophysiques,

recommande d'inviter les administrations qui envisageraient de fermer leurs stations ionosphériques avant 1978 à communiquer les noms des stations concernées à l'INAG et à lui faire savoir si elles estiment que l'importance internationale de leurs stations pourrait avoir quelque influence sur leurs décisions.

III.2. — Surveillance des changements a long terme dans l'ionosphère

La Commission III,

considérant

a) la fermeture de nombreuses stations ionosphériques ayant à leur actif de longues séquences d'observations (plus de 20 ans);

b) les représentations qui ont été faites à l'URSI (INAG) pour essayer de stopper cette tendance et, si possible, de faire rouvrir certaines de ces stations,

recommande d'inviter les scientifiques intéressés par l'étude de longues séquences de données ionosphériques : (i) à formuler une appréciation de la valeur potentielle du maintien de ces stations, (ii) à indiquer les stations dont la réouverture présenterait un intérêt particulier pour leurs recherches, (iii) à communiquer leurs conclusions à l'URSI (INAG).

Note. — Chaque cas devra être analysé séparément et les conclusions devront expliquer pourquoi le maintien d'une station en un lieu particulier est souhaitable. L'INAG ne pourra pas accepter les recommandations portant sur des groupes de stations.

III.3. — Stations ionosphériques nouvelles

La Commission III,

considérant le vif intérêt que suscite l'ouverture de stations de sondages ionosphériques à incidence verticale aux lieux suivants : Adak (Alaska), Anchorage (Alaska), Ile de l'Ascension, Ile Barter (Alaska), Ile de Pâques, Ile Gough (Atlantique Sud), et Sitka ou bien Juneau (Alaska),

décide

1. d'inviter les scientifiques intéressés par l'étude de données en provenance de l'un ou l'autre de ces lieux à faire connaître à l'INAG, dans le courant de 1976, les raisons de cet intérêt afin de pouvoir établir une liste de priorité;

2. d'attirer l'attention des administrations nationales sur l'intérêt exprimé à l'Assemblée générale de l'URSI en 1975 pour l'établissement de stations en ces lieux.

III.4. — Manuel de l'URSI pour le dépouillement et l'interprétation des ionogrammes (Supplément pour les hautes latitudes)

La Commission III,

considérant

a) que la traduction en français, en finnois, en japonais, en russe et en espagnol du texte intégral ou de parties de la deuxième édition du Manuel de l'URSI pour le dépouillement et l'interprétation des ionogrammes a sérieusement contribué à l'amélioration du fonctionnement du réseau des stations de sondages ionosphériques à incidence verticale;

b) que la valeur du Supplément pour les hautes latitudes serait également augmentée par sa traduction,

décide

1. d'exprimer ses remerciements aux organisations nationales qui ont bien voulu assurer ces traductions;

2. d'inviter les organisations nationales à faire leur possible pour fournir une traduction du Supplément pour les hautes latitudes tout au moins dans les langues japonaise, russe et espagnole.

III.5. — Programme de formation du personnel des stations ionosphériques

La Commission III,

considérant

a) que les données en provenance du réseau des stations de sondages ionosphériques à incidence verticale sont de plus en plus utilisées par des scientifiques n'ayant pas de connexion avec le réseau;

b) que, par conséquent, il est de plus en plus important d'assurer l'uniformité et la précision des données,

décide

1. d'attirer l'attention des administrateurs sur la nécessité d'assurer une meilleure formation au personnel responsable du fonctionnement des stations ionosphériques et sur l'existence de colloques spéciaux de perfectionnement dans plusieurs pays;

2. d'offrir la collaboration de l'INAG dans la coordination et l'orientation de ces efforts;

3. d'inviter tous les groupes qui organisent des colloques de perfectionnement à en communiquer les dates et lieux à l'INAG, ainsi que toutes les difficultés que ces colloques pourraient mettre en évidence.

III.6. — Observatoire de Jicamarca

La Commission III,

considérant les éminents résultats scientifiques obtenus dans l'étude de l'ionosphère équatoriale par l'Observatoire radioélectrique de Jicamarca, Pérou,

décide

1. d'exprimer son intérêt et sa satisfaction devant la création de la « Jicamarca Users and Sponsors Association (JUSA) »;

2. d'inviter les Membres officiels de la Commission G de l'URSI à attirer l'attention de leurs collègues et de leurs administrations nationales sur la possibilité d'entreprendre des recherches à l'Observatoire de Jicamarca contre paiement d'un droit.

III.7. — Sondages a diffusion incohérente en Asie

La Commission III,

considérant

a) que la technique des sondages à diffusion incohérente permet d'obtenir des paramètres importants pour la description de l'ionosphère et de l'atmosphère;

b) qu'il n'existe pas de sondeur de ce genre dans la région asiatique;

c) que l'installation d'un tel sondeur contribuerait à améliorer la connaissance de l'environnement terrestre, et plus spécialement la compréhension de la structure et de la dynamique de l'atmosphère et de la haute atmosphère,

décide d'inviter instamment les scientifiques de la région asiatique à explorer les possibilités de construire une station de sondages à diffusion incohérente dans leur région.

III.8. — Programme de la moyenne atmosphère

La Commission III,

considérant

a) que le SCOSTEP procède à une redéfinition de son Programme sur la structure et l'énergétique de la stratosphère et de la mésopshère sous la dénomination de Programme de la moyenne atmosphère;

b) que les techniques de la télédétection seront appelées à jouer un grand rôle lorsqu'elles auront été entièrement mises au point,

recommande que la Commission G participe à la définition du nouveau programme en collaboration avec les autres organismes intéressés du CIUS.

III.9. — Indices pour la prévision de la propagation ionosphérique

La Commission III,

considérant

a) que le CCIR a recommandé en 1962 l'utilisation de l'indice ionosphérique IF_2 pour l'établissement des prévisions ionosphériques;

b) que les valeurs médianes mensuelles de foF2 en provenance de 11 stations de sondages à incidence verticale sont nécessaires pour l'établissement de cet indice;

c) que les raisons invoquées en 1962 pour utiliser IF_2 de préférence au flux du bruit solaire (ø) sur 2 800 MHz ne sont plus valables;

d) qu'une seule station, située en n'importe quel point du monde, peut actuellement effectuer la mesure absolue de ø avec suffisamment de précision,

décide

1. d'attirer l'attention de la Commission d'études 6 du CCIR sur les progrès réalisés dans ce domaine depuis 1962;

2. de recommander que soit examinée la possibilité de remplacer IF_2 par ø.

III.10. — Groupes de travail

La Commission III,

recommande le renouvellement du mandat ou la constitution des Groupes de travail suivants au sein de la Commission G :

G.1. *Groupe Conseil du Réseau Ionosphérique* (INAG).

Président : W.R. Piggott (R-U); Vice-Président : J.V. Lincoln (EUA).

Mandat : conseiller les stations du réseau ionosphérique et servir de liaison entre ces stations et la communauté scientifique.

G.2. *Observation des mouvements dans l'ionosphère.*

Président : K. Sprenger (RDA); Vice-Président : A. Spizzichino (France).

Mandat : coordonner les mesures des mouvements horizontaux dans l'ionosphère.

G.3. *Mesure de l'absorption ionosphérique.*

Président : H. Schwentek (RFA); Vice-Président : K.M. Kotadia (Inde).

Mandat : coordonner les mesures de l'absorption ionosphérique.

G.4. *Traitement des données dans la recherche ionosphérique.*

Président : J.W. Wright (EUA); Vice-Président : A. Haug (Norvège).

Mandat : promouvoir l'échange de données et favoriser un accord international pour le traitement et l'échange optima des données ionosphériques.

G.5. *Groupe d'études ionosphériques de l'hémisphère austral* (SHISG).

Co-présidents : J.A. Gledhill (Afrique du Sud), S.M. Radicella (Argentine).

Mandat : encourager et coordonner les études de l'ionosphère et des communications ionosphériques dans l'hémisphère sud.

G.6. *Modèles morphologiques de l'ionosphère.*

Président : K. Rawer (RFA).

Mandat : coordonner les travaux pour l'établissement de modèles numériques et analytiques de la densité électronique et des paramètres correspondants de l'ionosphère.

G.6.1. *Ionosphère de Référence Internationale* (IRI).

Président : K. Rawer (RFA).

Mandat : établir, en collaboration avec le COSPAR, des modèles de référence de la structure verticale de l'ionosphère.

G.6.2. *Profils de densité électronique complets.*

Président : L.F. McNamara (Australie).

Mandat : examiner les méthodes pour la déduction des profils de densité électronique complets.

G.6.3. *Cartographie ionosphérique.*

Président : C.M. Rush (EUA).

Mandat : examiner les méthodes pour l'élaboration de cartes globales de paramètres ionosphériques sélectionnés.

G.7. *Echauffement artificiel de l'ionosphère.*

Président : W.E. Gordon (EUA); Vice-Président : W.F. Utlaut (EUA).

Mandat : promouvoir l'étude des effets de l'échauffement artificiel de l'ionosphère et ses influences sur les communications.

G.8. *Diffusion incohérente.*

Président : P. Bauer (France); Vice-Président : J.V. Evans (EUA).

Mandat : échanger des données expérimentales et théoriques sur la technique de la diffusion incohérente et préparer des programmes mettant en jeu cette technique.

G.9. *Influence de l'ionosphère sur les systèmes radioélectriques.*

Président : J.W. King (R.U.).

G.9.1. *Influence de l'ionosphère sur la propagation au-dessous de 300 kHz.*

Co-présidents : H.G. Booker (EUA), T.B. Jones (R-U).

Mandant : étudier tous les aspects de la propagation des ondes radioélectriques sur les fréquences inférieures à 300 kHz mettant en jeu l'ionosphère.

G.9.2. *Propagation ionosphérique normale sur les fréquences supérieures à 300 kHz.*

Président : H.G. Moeller (RFA); Vice-Président : J.M. Kelso (EUA).

Mandant : étudier tous les aspects de la propagation ionosphérique sol-sol au moyen des couches normales en ondes hectométriques et décamétriques.

G.9.3. *Propagation ionosphérique anormale associée à des caractéristiques particulières de l'ionosphère.*

Président : C.G. McCue (Australie); Vice-Présidents : I. Kasuya (Japon) et E.K. Smith (EUA).

Mandat : étudier les effets des caractéristiques temporelles et spatiales (par ex. E sporadique, F diffus, flux électriques, perturbations) sur la propagation sol-sol sur les fréquences supérieures à 300 kHz.

G.10. *Diffusion et scintillation dans l'ionosphère.*

Président : J. Aarons (EUA); Vice-Président : E.J. Fremouw (EUA).

Mandant : étudier les aspects expérimentaux et théoriques de la diffusion et de la dispersion des ondes radioélectriques par des irrégularités.

Note : *voir aussi Rés. IV.2 (Groupe de travail mixte G-H).*

III.11. — GROUPES DE TRAVAIL INTER-UNIONS URSI-UGGI(IAGA)

La Commission III,

recommande le maintien des Groupes de travail inter-Unions URSI/UGGI (IAGA) suivants, sous réserve de ratification par l'UGGI (IAGA) :

1. *Structure et dynamique de la thermosphère, de l'ionosphère et de l'exosphère.*

   Président : H. Rishbeth (R-U); Vice-Présidents : G. Kockarts (Belgique) et H. Kohl (RFA).

2. *Chimie des particules neutres et ionisées; flux solaires.*

   Présidents : L. Thomas (R-U); Vice-Présidents : A.D. Danilov (URSS) et T. Tohmatsu (Japon).

3. *Interactions stratosphère/mésosphère/ionosphère.*

   Président : J.B. Gregory (Canada); Vice-Présidents : M. Ackerman (Belgique) et C.F. Sechrist (EUA).

COMMISSION IV. — MAGNÉTOSPHÈRE

IV.1. — Mandat de la Commission H

La Commission IV,

notant et approuvant la recommandation du Conseil de l'URSI sur la réorganisation de l'Union, ainsi que le titre « Ondes dans les plasmas » qui a été proposé pour la Commission H;

considérant qu'il est souhaitable de faire une plus nette distinction entre d'une part, les aspects de l'étude des phénomènes ondulatoires dans les plasmas naturels qui relèvent de la géophysique et, de l'autre, les aspects qui relèvent de la radiophysique,

recommande que la Commission H prenne sans délai les mesures nécessaires pour définir ses attributions dans le cadre de l'étude des caractéristiques spécifiques des phénomènes ondulatoires dans les plasmas.

IV.2. — Groupes de travail

La Commission IV,

recommande que la Commission H de l'URSI constitue des Groupes de travail pour l'étude des sujets suivants :

H1. Instabilités de plasma (en commun avec la Commission G) : J.A. Fejer et D.T. Farley;

H2. Antennes dans les plasmas (en commun avec la Commission B) : R.W. Fredricks;

H3. Analyse des ondes (en commun avec la Commission C) : D. Jones et J.L. Lacoume;

H4. Dispositifs radioélectriques à plasma : F.W. Perkins;

H5. Expériences actives : F.L. Scarf.

IV.3. — Groupes de travail inter-Unions

La Commission IV,

considérant

a) la nouvelle orientation de la Commission H définie par la Rés. IV.1;

b) la nécessité de maintenir, sur les sujets d'intérêt commun, des liens étroits avec l'IAGA;

c) l'efficacité du travail effectué par le Groupe de travail URSI-IAGA sur l'oval auroral et son extension dans l'espace;

exprime ses remerciements aux co-présidents de ce Groupe de travail, C.T. Russell et B. Hultquist, pour le travail qu'ils ont accompli;

recommande

1. que les Groupes de travail URSI-IAGA sur la Physique de la plasmapause et sur l'Oval auroral et son extension dans l'espace soient dissous;

2. que deux nouveaux Groupes de travail URSI-IAGA soient constitués pour l'étude des sujets suivants :

1) Instabilités des ondes dans les plasmas spatiaux dont les co-présidents, pour l'URSI, seraient F.L. Scarf et D. Papadopoulos;
2) Sondage de la magnétosphère au moyen des sifflements et des pulsations magnétiques (en commun avec la Commission G de l'URSI) dont le Président, pour l'URSI, serait D. Carpenter.

IV.4. — Traitement automatisé des données

La Commission IV,

considérant

a) que les expériences de sondage passif et actif en très basses fréquences peuvent apporter une contribution importante à l'étude de la magnétosphère dans le cadre de l'Etude Magnétosphérique Internationale (IMS);

b) que la pleine réussite scientifique des mesures proposées dépendra dans une grande mesure de la rapidité du traitement et de la comparaison des données en provenance de stations distantes et de nouveaux instruments,

recommande que tous les groupes qui effectuent ces expériences, séparément ou ensemble selon leur convenance, mettent au point et appliquent des techniques automatisées pour les phases clés de l'acquisition et du traitement des données.

IV.5. — Colloques

La Commission IV,

recommande

1. que l'URSI accorde son copatronage au Colloque que le COSPAR organise en 1976 sur les Expériences actives dans les plasmas spatiaux

et que C.T. Russell soit désigné comme représentant de l'URSI au sein du Comité du Programme;

2. que l'URSI accorde son copatronage au Colloque régional sur la magnétosphère et son environnement, qui se tiendra à Christchurch, Nouvelle Zélande en janvier 1977, sous réserve que soient inscrits au programme des sujets relatifs aux ondes dans les plasmas ionisés;

3. que, pendant la XIX[e] Assemblée générale (Helsinki, 1978), les Commissions B, C, F, G et H organisent un Colloque commun sur le sujet suivant : Télédétection des structures non homogènes dans l'environnement de la Terre, suivant la proposition de M. Crochet.

COMMISSION V. — RADIOASTRONOMIE

V.1. — Système de radiotélescopes intercontinental

La Commission V,

considérant

a) qu'un système de radiotélescopes d'une résolution inférieure à 1 milliseconde d'arc serait souhaitable pour l'étude des sources radioélectriques compactes qui se trouvent dans les quasars, les noyaux galactiques, les masers moléculaires interstellaires, les pulsars et les étoiles radioélectriques, ainsi que pour de nombreux programmes d'expériences géophysiques et géodésiques;

b) qu'avec ses éléments situés dans plusieurs pays, ce système serait à la dimension du globe;

c) qu'il pourrait être approprié de construire et de faire fonctionner cet ensemble d'instruments sur une base internationale,

décide que la Commission J de l'URSI poursuivra l'étude des possibilités de réalisation de ce projet.

V.2. — Gamme dynamique des systèmes de radiotélescopes

La Commission V,

considérant les propositions provisoires faites en vue de l'organisation aux Pays-Bas en 1976 ou 1977 d'une réunion de travail sur la portée dynamique des systèmes de radiotélescopes,

recommande que la possibilité pour l'URSI d'accorder son copatronage à cette réunion soit examinée.

V.3. — Astronomie galactique et extragalactique dans l'infrarouge et en ondes sub-millimétriques

La Commission V,

considérant l'invitation adressée par le COSPAR à l'URSI de copatronner le Colloque sur l'Astronomie galactique et extragalactique dans l'infrarouge et en ondes sub-millimétriques, qui se tiendra à Philadelphia en 1976,

recommande d'accepter cette invitation et de désigner le Prof. A.H. Barrett comme représentant de l'URSI au Comité du programme du Colloque.

COMMISSION VI. — ONDES ET CIRCUITS RADIOÉLECTRIQUES

VI.1. — Colloques et autres réunions 1976-1978

La Commission VI,

considérant l'intérêt que présentent pour l'URSI les réunions suivantes :

1) Colloque sur la théorie de l'information, Rönnby, Suède 1976,
2) Ecole d'été sur la théorie des circuits, Prague 1977,
3) Colloque sur la théorie électromagnétique, région de San Francisco 1977,
4) Colloque sur la compatibilité électromagnétique, 1977,
5) Eurocon, Venise 1977,
6) Colloque sur les communications aux hyperfréquences, Budapest 1978,

recommande que l'URSI examine l'opportunité d'accorder son co-patronage à certaines de ces réunions ou à toutes.

COMMISSION VII. — RADIOÉLECTRONIQUE

VII.1. — Colloque sur les dispositifs optiques

La Commission VII,

considérant que l'Assemblée générale de l'URSI s'étend déjà sur une période de temps assez longue et qu'il ne serait pas souhaitable d'en prolonger la durée par l'organisation préalable d'un colloque,

recommande

1. que la Commission D de l'URSI organise un colloque ouvert d'un jour pendant la période même de l'Assemblée en 1978;

2. que ce colloque soit consacré aux dispositifs optiques pour les systèmes de télécommunications et pour le mélange ou la multiplication des fréquences;

3. que la possibilité soit examinée d'organiser ce colloque en commun avec les Commissions A, B et C.

VII.2. — Contacts entre scientifiques de différentes disciplines

La Commission VII,

considérant

a) que les nombreux sujets inscrits au programme des séances scientifiques des Commissions de l'URSI pendant les Assemblées générales touchent tous à un aspect ou à l'autre des télécommunications;

b) que ces séances peuvent fournir de précieuses occasions pour la prise de contacts entre scientifiques de disciplines différentes,

recommande

1. que les détails concernant les conférenciers et les titres de leurs communications, ainsi que l'horaire des séances pour toutes les Commissions soient fixés bien avant l'ouverture de l'Assemblée;

2. que le programme détaillé de ces séances soit remis à chaque délégué lors de son inscription à l'Assemblée.

Note : *Cette Recommandation sera soumise à l'examen du Bureau.*

COMMISSION VIII
BRUIT RADIOÉLECTRIQUE D'ORIGINE TERRESTRE

VIII.1. — Colloques et autres réunions

La Commission VIII,

considérant le domaine d'études attribué à la Commission E de l'URSI,
recommande

1. que l'URSI examine la possibilité d'accorder son copatronage aux réun ions suivantes :

   1.1. conférence sur la localisation mondiale des atmosphériques (envisagé en République fédérale d'Allemagne),

   1.2. conférence sur l'enregistrement des éclairs (Uppsala, Suède);

2. que la Commission E examine la possibilité d'organiser des colloques sur certains des sujets suivants :

   2.1. Atmosphériques (en 1978, peut-être en collaboration avec la Commission d'électricité atmosphérique de l'IAMAP),

   2.2. Compteurs d'éclairs,

   2.3. Variations liées au cycle solaire dans les brouillages dus au bruit,

   2.4. Bruit naturel dans l'espace (peut-être en collaboration avec la Commission H).