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U. R. S. I.

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INFORMATIVE PAPER

The Past of U.R.S.I.

Methods of Measurements and Standards

Thanks to the kindness of Mr. W. D. George, Vice-Chairman of Commission I, we are able to publish the following report. This document will show to our readers the long and fruitful acquaintance with U.R.S.I. of our Honorary President, Dr. J. H. Dellinger, who is still taking a very active part in our activities.

We should appreciate to receive similar documents as it is sometimes helpful to look at early papers.

As it was stated by Mr. George : « We know that science and technology are moving rapidly in U.R.S.I. and some of us may wonder about the problems, progress and language a few decades back ».

International Union of Scientific Radio Telegraphy
American Section

(Meeting held April 28, 1924)

Report of Committee on Methods of Measurements and Standards

by J. H. Dellinger, *Chairman*

The improvement of accuracy of frequency measurement and frequency standards continues to have the active attention of research workers. The importance of this line of work is emphasized by the vast increase in the use of radio communication and the consequent necessity of operating transmitting stations as close together in frequency as possible. Station engineers are paying increasing attention to the holding of station frequencies constant by the use of wavemeters and also by the use of « frequency indicators » which are simply onepoint wavemeters which are adjusted

to resonance during operation. Frequency measurements and standards are approaching the point where it will be possible to conduct continuous-wave communication and secure an audible beat note by a predetermined setting of the receiving apparatus.

Multivibrator. — Measurements at the Bureau of Standards indicate that it is desirable to use the multivibrator system in two steps, one generator operating at about 1 kilocycle and one at about 20 to 40 kilocycles. This is also found in the National Physical Laboratory, England, where a method has been worked out to control the higher frequency generator by the 20th harmonic of the first.

Capacity and Inductance. — The determination of frequency by calculation from measured or calculated capacity and inductance, is one of the methods used both by the Bureau of Standards and the National Physical Laboratory. It is found that the method agrees to about 0.1 % with other methods of assigning a frequency basis.

Parallel Wire Measurement of Wave Length. — The Bureau of Standards has obtained satisfactory accuracy in the direct measurement of wave length of standing waves on a pair of parallel wires using wave lengths of the order of ten meters. The frequencies established by these wave length measurements agree within the limits of the errors of measurement, with the values obtained by four or five other independent methods. To obtain this accuracy, however, it is necessary to apply a correction depending upon the frequency and dimensions of the system used. This correction, which has recently been worked out, is of the order of 0.1 % for practical cases.

Radio-frequency Alternator. — The direct measurement of speed of a number of radio-frequency alternators has been utilized as a check upon frequency standards through a series of measurements by the Bureau of Standards and the Radio Corporation of America. The speeds of the alternators at several of the high power stations of the Radio Corporation were measured over a period of several months and measurements of the emitted wave frequencies were made simultaneously by the Radio Corporation

and the Bureau. The agreements were within the order of accuracy of the measurements, namely, about 0.2 %.

Piezo-electric Frequency Standards. — Researches have been continued by Professor Cady at Wesleyan University and Professor Pierce at Harvard and by the Naval Research Laboratory. It appears that quartz resonators are probably extremely constant frequency standards, their reliability being probably limited only by temperature variations so that they should be dependable within 0.01 %. Methods are being developed to use piezo-electric oscillators as generators of radio frequency in such a way as to control and increase the constancy of frequency of electron tube generators of radio-frequency currents.

Dissemination of Standard Frequencies. — The Bureau of Standards has continued transmissions of semi-monthly schedules of standard frequency signals, covering the range from 125 to 2000 kilocycles. A station for giving the same standard frequency service to the western part of the country has been established by the Bureau in cooperation with Stanford University, Palo Alto, California. These standard frequency signals differ from those which have been supplied from certain French stations in that a wider frequency range is covered and the exact value of the frequency is stated during the transmission. Another method that is being utilized by the Bureau of Standards to make its frequency standards available is the announcement in a monthly publication (the Radio Service Bulletin), of stations whose frequency its measurements have shown to be constant to a stated accuracy. Such stations thus become available as standard frequency points.

Comparison of National Frequency Standards. — Work is now in progress on simultaneous measurement of the frequencies of certain European and American stations by the national laboratories of England, France, Germany and the United States. These measurements, which are occupying a period of two months, will give a direct comparison of the frequency standards of these countries.

General. — This report is not the place to detail such advances as are being made in the standards and methods of measuring various radio-frequency quantities. A recent report has been

prepared by the British National Committee for Wireless Telegraphy. A new edition of Bureau of Standards Circular 74 « Radio Instruments and Measurements », has just been issued.

The designation of frequencies in kilocycles instead of wave lengths in meters is gaining ground. More technical articles are appearing which use kilocycles exclusively, and this practice is increasing in government reports and correspondence on radio subjects.

There is increasing activity leading toward international standardization of radio terminology. The Standardization Committee of the Institute of Radio Engineers is working actively on a revision of the 1922 report on this subject. The National Committees of the International Electrotechnical Commission of England, France and Italy have prepared definite proposals for standard radio symbols. This subject will probably be taken up at a special international conference at the Hague during the coming summer under the auspices of the International Electrotechnical Commission. Fortunately the practices are in different countries fairly uniform and it seems likely that there will not be great difficulty in securing a large measure of agreement.

XIVe ASSEMBLÉE GÉNÉRALE

Comité de Coordination

Le Comité de Coordination de l'U.R.S.I. (Membres du Bureau et Présidents des Commissions) se réunira dans le courant du printemps 1962 pour examiner les questions relatives à l'organisation de l'Assemblée Générale suivante (Japon, 1963).

Les Membres des Comités Nationaux, des Commissions et Comités qui désireraient présenter des suggestions au Comité de Coordination sont invités à les faire parvenir au Secrétaire Général de l'U.R.S.I. avant le 15 mars 1962.

XIVth GENERAL ASSEMBLY

Co-ordinating Committee

The Co-ordinating Committee of U.R.S.I. (Officers of the Board and Commission Chairmen) will meet during the Spring 1962 to consider the organization of the forthcoming General Assembly (Japan, 1963).

Members of National Committees, Commissions and Committees who would like to submit suggestions to this meeting are kindly requested to send them to the Secretary General of U.R.S.I. before March 15th, 1962.

NATIONAL COMMITTEES

Czechoslovakia

BIBLIOGRAPHY

We inform our readers that the Institute of Radio Engineering and Electronics, Czechoslovak Academy of Sciences, has issued the following publications in English :

18. — P. Beckmann : The statistical distribution of the amplitude and phase of a multiply scattered field.

19. — P. Beckmann : The depolarization of electromagnetic waves by inclined planes.

20. — B. Chytil : Depolarization by randomly scatterers.

21. — B. Chytil : Polarization — dependent scattering cross-sections.

The publications contain also summaries in English, Russian, French, German and Czechoslovak.

Republic of South Africa

ANNUAL REPORT 1960-1961

The Annual Report 1960-61 of the National Institute for Telecommunications Research edited by the South African Council for Scientific and Industrial Research, Pretoria, has been issued.

Besides the membership of the National Institute for Telecommunications Research and an introduction the report contains the following items :

— The propagation of radio waves : vertical incidence ionospheric soundings and forecasts ; vertical incidence ionospheric absorption ; radio noise levels below 30 Mc/s.

— Studies of natural phenomena : radar echoes from lightning ; radar echoes from thunderstorms on various wavelengths ; the polarization of weather echoes on 10 cm radar in South Africa.

— Advanced radio techniques : the Tellurometer system of distance measurement ; the Terrafix system of position fixing ; long range radar ; parametric amplifiers.

— Radio and Space research : the Minitrack Station, Esselen Park ; the deep space tracking programme ; the new Minitrack Station.

Suisse

REUNION ANNUELLE

La réunion traditionnelle a eu lieu le 17 novembre dans les locaux de l'Université de Bâle. La partie scientifique était consacrée au thème « Recherche spatiale et technique des télécommunications ». Les exposés suivants furent présentés :

M. Golay. — La recherche spatiale.

F. Lüdi. — Physik des Plasmas.

B. Elschner. — Physikalische Grundlagen und Anwendungsmöglichkeiten der Maser und Laser.

W. Klein. — Radioverbindungen über die Exosphäre.

Les participants purent en outre, au moyen d'un enregistrement exécuté par les soins des Jet Propulsion Laboratories du California Institute of Technology, prendre connaissance des résultats du « Moon-Bounce Experiment », ainsi que du « Project Echo Experiment Transmissions ».

La prochaine réunion annuelle aura lieu à l'Institut fédéral de recherches en matière de réacteurs à Würenlingen.

Berne, le 6 décembre 1961.

W. Gerber.

U. S. A.

1962 NBS COURSE IN RADIO PROPAGATION

The 1962 National Bureau of Standards course in Radio Propagation will be given July 16 through August 3. The course, administered by the NBS Boulder, Colo., Laboratories, is open to scientific and engineering personnel in other Government agencies, industry, or universities.

There were 235 participants in the 1961 Radio Propagation course, representing almost every state in the Union and several foreign countries. The course is being repeated in 1962 in response to requests from many individuals who were unable to attend in 1961.

Full particulars concerning the 1962 curriculum and information concerning registration will be published in the near future by the Boulder Laboratories' Graduate School which is directed by E. H. Brown, consultant in mathematical physics.

COMMISSIONS AND COMMITTEES

Commission I

On Radio Standards and Measurement Methods

INTERNATIONAL CONFERENCE ON PRECISION ELECTROMAGNETIC MEASUREMENTS

August 14, 15 and 16, 1962
Boulder, Colorado — United States of America

Sponsored by : National Bureau of Standards Radio Standards Laboratory, Institute of Radio Engineers Professional Group on Instrumentation, American Institute of Electrical Engineers Instrumentation Division.

The 1962 International Conference on Precision Electromagnetic Measurements (formerly Conference on Standards and Electronic Measurements) will be held August 14, 15 and 16 at the Boulder Laboratories of the National Bureau of Standards, Boulder, Colorado.

This Conference is sponsored by the Radio Standards Laboratory of the National Bureau of Standards, the Professional Group on Instrumentation of the Institute of Radio Engineers, and the Instrumentation Division of the American Institute of Electrical Engineers. Previous conferences (1958 and 1960) each attracted more than 800 participants from industrial, university, and government laboratories throughout the world.

The change of name points up the basic aim of the Conference which is the advancement of standards and accurate measurement throughout the coherent frequency spectrum. In addition, the 1962 Conference will give more emphasis to the impact of quantum

electronics and space physics on precision electromagnetic measurements.

In its concern with the strictly technical aspect of measurement, this Conference will not include papers describing the large-scale organization and operation of standards laboratories (as did the conferences of 1958 and 1960). The interest in both fields is so great that the two subjects may not be adequately handled in a single conference. The second field, however, may be covered in a second conference which would closely precede or follow the International Conference on Precision Electromagnetic Measurements.

The change in name also reflects the international aspects of the Conference. There are few if any other conferences with the same basic goal, yet there is a need to exchange such knowledge on a global basis and also to actively support and advance international standardization in the electromagnetic area. This need is evidenced by the fact that inquiries concerning the 1962 Conferencc have already been received from several laboratories in Europe.

Call for papers

Original papers in the following areas will be considered for presentation : (1) atomic frequency and time, (2) determination of conductivity and complex (tensor) electric and magnetic susceptibilities, (3) direct current and low frequency measurements, (4) radio frequency and microwave measurements, (5) quantum electronics in precision measurements, (6) electromagnetic measurements for space exploration, and (7) data reduction in precision measurements.

Titles and summaries will be accepted in English or French but papers will be published in English. As before, it is planned to publish a conference record by including the conference papers in one issue of the I.R.E. Transactions on Instrumentation.

Papers should be submitted to : Dr. George Birnbaum, Hughes Research Laboratory, Malibu, California.

These should be in the form of 500 to 1,000 word summaries.

The deadline for submission of summaries is March 15, 1962. Notifications of acceptance or rejection will be mailed by April 15, 1962. The full technical program will be announced about June 1,

1962. This, with the registration brochure, will be mailed to : those attending the 1960 Conference, members of I.R.E.-P.G.I., I.R.E.-P.G.M.T.T., and A.I.E.E. Instrumentation Division.

Further details relating to the Conference, including registration forms (available about June 1), can be obtained by writing : James F. Brockman, National Bureau of Standards, Boulder, Colorado.

Commission III. — On Ionospheric Radio

MEAN ELECTRON DENSITY VARIATIONS OF THE QUIET IONOSPHERE

Attention is called to Technical Note nº 40-6 of the Boulder Laboratories « Mean Electron Density Variations of the Quiet Ionosphere » by J. W. Wright, L. R. Wescott and D. J. Brown of the Central Radio Propagation Laboratory.

The C.R.P.L. has initiated a program for large-scale computation of electron density profiles from ionospheric vertical soundings. Scaling is performed at field stations, permitting computation of hourly profiles at the Central Laboratory. These profiles are combined to form hourly mean quiet profiles for each station and month. The results of this program for the month of June are illustrated graphically in the report. This report is the sixth of a series illustrating the electron density variations in the mean quiet ionosphere between latitudes 15º N and 50º N along the 75º W meridian.

Groupe de Travail sur la Distribution Électronique en altitude N(h)

Erratum

Nous prions nos lecteurs de bien vouloir apporter la correction suivante au *Bulletin d'Information* nº 123, page 47, 22e ligne : remplacer « aux heures de midi » par « aux environs de minuit ».

Commission V. — Radioastronomie

UN RADIOTELESCOPE DE 300 M DE DIAMETRE EN CONSTRUCTION A PORTO RICO

(Extrait du *Journal des Télécommunications*, V. 28, nº 11, nov. 1961)

Un radiotélescope équipé d'une antenne de 1000 pieds (304,8 m) de diamètre est actuellement en voie d'achèvement à Arecibo (Porto Rico). Ce nouveau télescope dépassera donc en envergure celui de Jodrell Bank dont l'antenne a un diamètre de 250 pieds (76,2 m) et même celui qui est actuellement en construction à Sugar Grove (Virginie de l'Ouest) dont l'antenne atteindra 600 pieds (182,8 m) de diamètre. Il n'aura cependant pas la souplesse d'exploitation de ces deux installations.

Le nouveau télescope sera utilisé principalement pour des recherches ionosphériques. La superficie de son antenne atteindra 18 acres (7,2 ha) et il sera capable de déceler la présence d'un réflecteur de moins d'un mètre carré à une distance de 22.000 milles (plus de 35.000 km).

L'emplacement choisi à Porto Rico a l'avantage d'avoir une configuration naturelle circulaire et d'être situé dans une région exempte de tout bruit radioélectrique. De plus sa latitude de 23,5º permettra de faire des observations planétaires dans un faisceau de 20º (Wireless World).

1000-FT RADIO TELESCOPE IN POERTO RICO

(Reprint from the *Telecommunication Journal*, Vol. 28, nº 11, Nov. 1961)

Now under construction at Arecibo, Puerto Rico, and expected to be completed shortly, is a 1000-ft diameter radio telescope. When completed, this new telescope will dwarf the 250-ft diameter Jodrell Bank telescope and 600-ft diameter radio telescope now being built at Sugar Grove, West Virginia. It will not however be as flexible in operation as either of these two telescopes.

When completed the telescope is to be used for investigations into the nature of the ionosphere.

The Arecibo radio telescope will have an aerial area of 18 acres, and will be able to detect a reflector only 3 ft square at a distance of 22.000 miles.

Advantages of the Puerto Rican location as a site for this telescope are the natural bowl-like configuration of the valley in which it is situated, absence of radio noise in the area, and the latitude. This last is within 23° ½ of the equator, thus permitting planetary observations with 20° of beam span (Wireless World).

U.RS.I.-C.I.G. Committee

WORLD WIDE SOUNDINGS COMMITTEE

Bibliography

Attention is called to Report n° 1064 of the Defence Research Telecommunications Establishment (Defence Research Board of Canada, Ottawa) « The complexity of High Latitude Ionograms » by E. E. Stevens.

In this report, a collection of ionograms, obtained at Canadian stations during the I.G.Y., are classified according to various conditions peculiar to the high latitude ionosphere. The complexity of high latitude ionograms, as compared to those obtained at lower latitudes, is clearly indicated.

SERVICES PERMANENTS

Service International des Journées Mondiales

(See English text on p. 19)

CALENDRIER GEOPHYSIQUE INTERNATIONAL 1962

1. But. — Le Calendrier Géophysique International pour 1962 indique les journées et intervalles choisis, pendant lesquels une attention particulière est à consacrer aux expériences et analyses géophysiques ; de ce fait il fournit un cadre de coordination à l'échelle mondiale. Il porte principalement sur les domaines de la géophysique relatifs à l'atmosphère terrestre, dans laquelle de nombreux phénomènes accusent des variations significatives dans le courant de l'année. Pour certaines expériences, telles que l'enregistrement des variations du champ magnétique terrestre, les observatoires remplissent des programmes d'observation et d'analyse répartis uniformément sur toute l'année ; dans ces cas-là le Calendrier n'est guère nécessaire. Cependant, pour de nombreuses autres expériences (par exemple, expériences par fusées) il n'est ni pratique, ni intéressant d'exécuter un même programme au jour le jour. Dans ce cas, le Calendrier peut fournir un moyen de coordination utile : les expérimentateurs sauront que leurs collègues, dans d'autres pays, d'autres laboratoires et d'autres disciplines, s'efforceront, aux jours et intervalles figurant au Calendrier, de procéder à des expériences. De cette manière, les résultats de ces expériences pourront être comparés ultérieurement avec plus de facilité et d'utilité.

Pour certains domaines scientifiques, les organisations scientifiques internationales ont formulé des recommandations spéciales relatives aux programmes à effectuer pendant les journées et intervalles signalés au Calendrier. Pour d'autres, les arrangements sont non-officiels ou s'imposent d'eux-mêmes. Quelques exemples sont donnés ci-après :

2. Journées Mondiales Régulières (Regular World Days). — Celles-ci sont destinées aux observations, ou bien aux analyses, ou bien encore aux expériences spéciales qui ne peuvent pratiquement être effectuées que pendant 10 % des journées et doivent

être réparties sur toute l'année. Voici quelques exemples du domaine de la physique ionosphérique : émission et réception d'impulsions à incidence oblique ; mesures de l'absorption par la méthode des réflexions d'impulsions ; programme d'observation élargi pour les sifflements et les émissions à très basses fréquences ; ionogrammes à incidence verticale par « f-plot » et « h'-plot », etc. ; réduction horaire d'ionogrammes des paramètres « *hc* » et « *qc* » de la hauteur réelle de la région F.

Les Journées Mondiales Régulières de haute priorité sont prévues pour un travail analogue, qui ne peut être entrepris qu'un seul jour par mois. Le programme recommandé par l'U.R.S.I. pour l'échange d'ionogrammes originaux de sondages ionosphériques à incidence verticale constitue un exemple spécifique.

3. Intervalles Synoptiques Mondiaux (World Synoptic Intervals). — Ils sont consacrés aux expériences qui, pour des raisons d'ordre pratique, ne peuvent être effectuées d'une manière continue, mais pour lesquelles des statistiques des variations saisonnières sont particulièrement nécessaires. Afin de simplifier le Calendrier, les Journées Mondiales Régulières et les Intervalles Météorologiques Mondiaux des années précédentes ont été combinés de sorte à former une seule série d'intervalles. Etant donné le programme synoptique de fusées météorologiques établi par le C.O.S.P.A.R., les intervalles ont été fixés à un mois environ après les équinoxes et solstices — périodes de changements saisonniers marqués pour certains phénomènes météorologiques dans la haute atmosphère. Pendant l'Intervalle Synoptique Mondial, un réseau de stations, situées à 50 km ou moins l'une de l'autre, procède au moins une fois par jour au lancement de fusées météorologiques. Les programmes de ballons-sondes, avec instruments spéciaux ou lancements à des altitudes particulièrement hautes, prendront place dans le cadre de l'Intervalle Synoptique Mondial. D'autres programmes, tels que ceux portant sur les vents ionosphériques et les mesures des vents en haute atmosphère constituent d'autres exemples de programmes pour lesquels les Intervalles sont appropriés. Dans certaines disciplines, il est procédé pendant ces périodes à des échanges de données détaillées. On obtient ainsi, en combinaison avec les Journées Mondiales Régulières, un échantillonnage des variations durant toute l'année avec, en plus, des statistiques améliorées pour un mois de chaque saison.

4. Semaines Internationales des Fusées (International Rocket Week). — Ces semaines, sélectionnées par le C.O.S.P.A.R., fournissent deux périodes où un accent tout spécial sera mis sur les études scientifiques au moyen de fusées. Les données conjuguées de stations géophysiques au sol seront particulièrement utiles durant les Semaines Internationales des Fusées.

5. Autres Journées Spéciales. — Elles comprennent les journées des deux éclipses solaires de 1962 et de celle de janvier 1963. Il est à prévoir que des programmes spéciaux seront mis en œuvre dans les parties du monde appropriées pour étudier les effets de l'éclipse sur l'atmosphère terrestre. Ordinairement les stations ionosphériques étendent leurs programmes d'observation, même si la magnitude de l'éclipse est petite à l'endroit où elles sont situées. De nombreux observatoires procèdent à des observations spéciales de l'activité solaire et publient des rapports spéciaux détaillés pour aider l'interprétation des données géophysiques. Le Calendrier indique également les journées où l'activité des essaims météoriques est inhabituelle, ce qui ne signifie pas nécessairement une haute activité visuelle, mais peut donner lieu, par exemple, à des échos radar inaccoutumés. Souvent, pendant ces journées-là, les géophysiciens renforcent leurs programmes d'observation. L'attention est aussi attirée sur les journées où l'ionisation produite par les météores peut éventuellement expliquer des effets spéciaux dans d'autres expériences géophysiques. La Journée Météorologique Mondiale annuelle, prévue pour le 23 mars, fut célébrée pour la première fois en 1961. Le but de cette Journée est de vulgariser et de faire apprécier par le public de tous les pays les services que les organisations météorologiques nationales peuvent rendre dans les diverses domaines du développement économique, ainsi que les activités de l'Organisation Météorologique Mondiale.

6. Intervalles Spéciaux ne figurant pas au Calendrier. — Les périodes de grandes perturbations magnétiques, aurorales et ionosphériques présentent également un grand intérêt géophysique. Une coordination, à l'échelle mondiale, des observations est particulièrement utile pour les stations qui ne sont pas situées à proximité des zones aurorales et où les observations locales ne permettent pas de déceler immédiatement le début d'une perturbation majeure.

Les avis d'Alertes Géophysiques et d'Intervalles Mondiaux Spéciaux sont régulièrement distribués par télégramme ou par radio par les Centres Régionaux d'Alertes solaires-géophysiques et dont les adresses télégraphiques sont les suivantes : AGIWARN WASHINGTON (U. S. A.); AGI KOKUBUNJI (Japon); NIZMIR MOSCOW (U. R. S. S.); IONOSPHARE DARMSTADT (R. F. A.) ou GENTELABO PARIS (France) ou encore AGI NEDERHORSTDENBERG (Pays-Bas). Le réseau de télécommunications météorologique, qui est coordonné par l'OMM, transmet ces informations une fois par jour quelque peu après 1600 TU. Nombreuses sont les stations géophysiques qui augmentent leurs programmes ou qui procèdent à des expériences spéciales pendant ces périodes de perturbations. C'est également par l'intermédiaire des Centres Régionaux d'Alertes que sont notifiés les phénomènes des éruptions solaires, qui entraînent des effets géophysiques importants et, souvent, de longue durée.

7. Le Service International des Journées Mondiales (I.W.D.S.) fut établi en 1958 par le Conseil International des Unions Scientifiques et est administré par l'Union Radio Scientifique Internationale (U.R.S.I.), 7, place Emile Danco, Bruxelles 18, Belgique. Le présent Calendrier a été établi par A. H. Shapley et J. V. Lincoln, en consultations avec les Unions et les Comités intéressés de l'I.C.S.U. et les représentants de l'O.M.M. (voir p. 23).

PERMANENT SERVICES

I. W. D. S.

(Voir texte français p. 16)

INTERNATIONAL GEOPHYSICAL CALENDAR 1962

1. Purpose. — The International Geophysical Calendar 1962 designates selected days and intervals for special attention for geophysical experiments and analysis and is thus a framework for world-wide coordination. It serves mainly the branches of geophysics dealing with the earth's atmosphere in which many phenomena vary significantly during the course of a year. In

some experiments, such as the routine recording of variations of the earth's magnetic field, the observing and analysis programs at observatories are normally carried out at a uniform level throughout the year ; in these cases the Calendar is not needed. However, in many other experiments (for example, rocket experiments), it is not practical or meaningful to carry out the same program on each and every day. Here the Calendar can provide a useful mechanism for coordination : experimenters will know that their colleagues in other countries, in other laboratories and in other disciplines will tend to also carry out experiments on the days or intervals marked on the Calendar. In this way, results of experiments may later be more easily and usefully compared.

In some scientific fields, international scientific organizations have made specific recommendations for programs to be done on days or intervals marked on the Calendar. In others, the arrangements are informal or self-evident. Some examples are given below.

2. Regular World Days (R. W. D.) are intended for observations or analyses or special experiments which as a practical matter can be done for only about 10 % of days and should be spaced throughout the year. Examples in Ionospheric Physics are : oblique incidence pulse transmission and reception ; absorption measurement by pulse reflection technique ; extended observing schedule for whistlers and V.L.F. emissions ; vertical sounding ionograms by *f*-plot, *h'*-plot, etc. ; hourly reduction from ionograms of F-region true height parameters « *hc* » and « *qc* ».

The R.W.D. with highest priority are for similar work which can be undertaken for only one day each month. A specific example is the program recommended by U.R.S.I. for exchange of copies of original ionograms in ionospheric vertical sounding work.

3. World Synoptic Intervals (W.S.I.) are intended for experiments which for practical reasons cannot be carried on continuously, but for which statistics of seasonal variations are especially needed. To simplify the Calendar the Regular World Intervals and World Meteorological Intervals of past years have been combined into one set of intervals. For the sake of the synoptic meteorological rocket programs as designated by

C.O.S.P.A.R. the intervals have been placed about a month after the equinoxes and solstices — the times of marked seasonal change in certain upper air meteorological phenomena. During W.S.I. meteorological rockets at a network of stations separated by 50 kilometers or less are launched at least once daily. Balloon sounding programs either with special instruments or launchings to unusually high balloon altitudes have been placed during W.S.I. Other programs such as ionospheric drift and high atmosphere wind measurements are other examples of suitable programs for such intervals. In several disciplines sample detailed data are interchanged during these periods. Combined with R.W.D. this provides a sampling of variations throughout the year but with improved statistics during one month of each season.

4. International Rocket Week (I.R.W.), selected by C.O.S.P.A.R., provide two periods during the year for special emphasis of scientific studies by means of rockets. Appropriate associated data from nearby ground geophysical station will be especially useful during I.R.W.

5. Other Special Days marked on the Calendar include the days of the two 1962 and that of January, 1963, solar eclipses when special programs may be expected to be carried out in appropriate parts of the world to study eclipse effects on the earth's atmosphere. Ionospheric stations customarily increase their observing programs even if the magnitude of eclipse at their location is small. Many solar activity observatories take extra observations and issue specially detailed reports to assist the interpretation of the geophysical efforts. Also shown are days when meteor shower activity is unusual does not necessarily mean high visual activity but can mean unusual radar echoes, for example. Geophysicists using meteor techniques often enhance their observing programs on these days. Attention is also called to these days in case ionization produced by meteors may account for unusual effects in other geophysical experiments. The Annual World Meteorological Day, selected as March 23, was first celebrated in 1961. Its purpose is to make the services which national meteorological services can render to the various branches of economic development, as well as the activities of the World Meteorological Organization better known and appreciated by the public of all countries.

6. Special Intervals not appearing on Calendar. — Periods of great magnetic, auroral and ionospheric disturbance are also of great geophysical interest. World-wide coordination of observation is especially useful for stations not near the auroral zones places where the beginning of a major disturbance may not be immediately apparent from local observations. Notices of Geophysical Alerts and Special World Intervals (S.W.I.) are distributed by telegram or radio broadcast on a current basis by the solar-geophysical Regional Warning Centers, whose telegraphic addresses are as follows : AGIWARN WASHINGTON (U. S. A.) ; AGI KOKUBUNJI (Japan) ; NIZMIR MOSCOW (U. S. S. R.) ; IONOSPHARE DARMSTADT (G. F. R.) or GENTELABO PARIS (France) or AGI NEDERHORSTENBERG (Netherlands). The meteorological telecommunications network coordinated by WMO carries such information once daily soon after 1600 UT. Many geophysical stations increase their programs or carry on special experiments during disturbed periods. Prompt notification of major solar flare events which have important and sometimes long lasting geophysical effects are also undertaken through the Regional Warning Centers.

7. The International World Day Service (I.W.D.S.) was established in 1958 by the International Council of Scientific Unions (I.C.S.U.) and is administered by the International Scientific Radio Union (U.R.S.I.), 7, Place Emile Danco, Brussels 18, Belgium. This Calendar has been drawn up by A. H. Shapley and J. V. Lincoln in consultation with interested I.C.S.U. unions and committees and representatives of the W.M.O.

INTERNATIONAL GEOPHYSICAL CALENDAR 1962

Issued October 1961 by the International World Day Service under the auspices of U. R. S. I.

1962 **JANUARY** 1962

S	M	T	W	T	F	S
	1	2	3	4	5	6
7	8	9	10	11	12	13
14	15	(16)	(17)	(18)	19	20
21	22	23	24	25	26	27
28	29	30	31			

1962 **FEBRUARY** 1962

S	M	T	W	T	F	S
				1	2	3
[4	5]	6	7	8	9	10
11	12	(13)	(14)	(15)	16	17
18	19	20	21	22	23	24
25	26	27	28			

1962 **MARCH** 1962

S	M	T	W	T	F	S
				1	2	3
4	5	6	7	8	9	10
11	12	13	14	15	16	17
18	19	(20)	(21)	(22)	23	24
25	26	27	28	29	30	31

1962 **APRIL** 1962

S	M	T	W	T	F	S
1	2	3	4	5	6	7
8	9	10	11	12	13	14
15	16	(17)	(18)	(19)	20	21
22	23	24	25	26	27	28
29	30					

1962 **MAY** 1962

S	M	T	W	T	F	S
		1	2	3	4	5
6	7	8	9	10	11	12
13	14	(15)	(16)	(17)	18	19
20	21	22	23	24	25	26
27	28	29	30	31		

1962 **JUNE** 1962

S	M	T	W	T	F	S
					1	2
3	4	5	6	7	8	9
10	11	12	13	14	15	16
17	18	(19)	(20)	(21)	22	23
24	25	26	27	28	29	30

1962 **JULY** 1962

S	M	T	W	T	F	S
1	2	3	4	5	6	7
8	9	10	11	12	13	14
15	16	(17)	(18)	(19)	20	21
22	23	24	25	26	27	28
29	30	[31]				

1962 **AUGUST** 1962

S	M	T	W	T	F	S
			1	2	3	4
5	6	7	8	9	10	11
12	13	(14)	(15)	(16)	17	18
19	20	21	22	23	24	25
26	27	28	29	30	31	

1962 **SEPTEMBER** 1962

S	M	T	W	T	F	S
						1
2	3	4	5	6	7	8
9	10	11	12	13	14	15
16	17	(18)	(19)	(20)	21	22
23	24	25	26	27	28	29
30						

1962 **OCTOBER** 1962

S	M	T	W	T	F	S
	1	2	3	4	5	6
7	8	9	10	11	12	13
14	15	(16)	(17)	(18)	19	20
21	22	23	24	25	26	27
28	29	30	31			

1962 **NOVEMBER** 1962

S	M	T	W	T	F	S
				1	2	3
4	5	6	7	8	9	10
11	12	(13)	(14)	(15)	16	17
18	19	20	21	22	23	24
25	26	27	28	29	30	

1962 **DECEMBER** 1962

S	M	T	W	T	F	S
						1
2	3	4	5	6	7	8
9	10	11	12	13	14	15
16	17	(18)	(19)	(20)	21	22
23	24	25	26	27	28	29
30	31					

1963 **JANUARY** 1963

S	M	T	W	T	F	S
		1	2	3	4	5
6	7	8	9	10	11	12
13	14	15	16	17	18	19
20	21	(22)	(23)	(24)	[25]	26
27	28	29	30	31		

(17) Regular World Day (RWD) (18) RWD with highest priority

[31] Day of Solar Eclipse

7 Day with unusual meteor shower activity

[16 17 18 19 . .] World Synoptic Interval, (WSI), combining World Meteorological Interval, Regular World Interval, International Rocket Week

SYMPOSIA

U.R.S.I. Symposium on Space Communication Research

At the XIIIth General Assembly of U.R.S.I., held in London in September 1960, the Union's Committee for Space Radio Research, under the Chairmanship of Dr. L. G. H. Huxley, proposed to hold two specialist symposia. One of these, on Space Communication Research, was suggested for the autumn of 1961, and a small working party, comprising Dr. J. R. Pierce (Convenor), Prof. V. I. Siforov, and one other nominee was established to organize this symposium. Subsequently, by kind invitation of the French National Committee of U.R.S.I., it was agreed to hold the meeting in Paris over the period 18-22 September 1961, and all the arrangements were made by a small committee consisting of Dr. J. R. Pierce (U. S. A.) (*Chairman*), Mr. G. M. Brown (U. K.), Mr. J. Voge (France), and Mr. F. du Castel (France) (*Secretary*).

A total of 116 delegates from 12 countries, and about 50 observers and representatives of national and international organizations, participated in the Symposium. Some 37 papers were presented and discussed in nine formal half-day sessions, held at the Ministère des P. et T., avenue de Ségur, Paris. Although the meeting was organized under the auspices of U.R.S.I., it had the full support of its collaborating body, C.O.S.P.A.R., the President of which, Prof. H. C. van de Hulst, participated in the Symposium.

The Symposium in Paris was held to exchange views on many of the problems which arise in considerations of satellite radio communications. The emphasis throughout was on the scientific and research aspects of the subjects. The main topics discussed were as follows.

Launching, attitude control, and tracking of satellites.
Frequency allocation, interference, and propagation problems.
Satellite and ground equipment.
Modulation systems.
Specific communication systems.

The papers presented at the Symposium, revised in the light of the discussions there, together with a summary of the discussions will shortly be published as an U.R.S.I. Monograph. This document should provide a useful contribution to the work of Study Group IV of C.C.I.R.

W. J. G. BEYNON,
Secretary of U. R. S. I. Committee on
Space Radio Research

4ème Congrès International « Tubes Hyperfréquences «

(See English text on p. 26)

Organisé par le « Nederlands Radiogenootschap (Comité National Néerlandais de l'U.R.S.I.) » sous le patronnage de l'U.R.S.I.

LA HAYE, 3-7 SEPTEMBRE 1962

Les résultats fructueux des congrès internationaux « Tubes Hyperfréquences » (Paris 1956, Londres 1958, et Munich 1960) ont incité le Nederlands Radiogenootschap NRG à se charger de l'organisation du 4e Congrès International « Tubes Hyperfréquences» 1962.

Ce congrès auquel l'U.R.S.I. a promis sa collaboration, sera organisé à La Haye du 3 au 7 septembre 1962.

Le Comité Préparatoire a le plaisir de lancer une invitation à tous ceux qui s'intéressent à l'étude, au développement et à l'utilisation de tubes hyperfréquences.

Le Comité Préparatoire exprime le vœu que de nombreuses adhésions lui parviennent — de toutes les parties du monde — pour qu'au cours d'une réunion effectivement internationale, un échange animé d'idées puisse fournir une contribution précieuse à cette tâche scientifique et technique.

Programme provisoire

Lundi 3 septembre. — matinée : Séance Plénière d'Ouverture ;
— après-midi : Conférences et discussions.

Du mardi 4 au jeudi 6 septembre. — Conférences et discussions.
Vendredi 7 septembre. — Excursions.

Les conférences, d'une durée maximale de 20 minutes, peuvent être données en anglais, en français ou en allemand ; elles traiteront d'un ou de plusieurs des sujets suivants :

1. Diodes et tubes à commande par grille.
2. Tubes à modulation de vitesse.
3. Tubes à onde progressive.
4. Tubes à onde inverse.
5. Magnétrons et tubes amplificateurs du type M.
6. Dispositifs paramétriques.
7. Dispositifs à décharge dans le gaz.
8. Masers, irasers et lasers.
9. Tubes de construction spéciale (ondulateurs, effet Cerenkov, générateurs harmoniques, etc.).
10. Bruit.
11. Systèmes électron-optiques (canons, concentration, etc.).
12. Cavités et constructions pour ondes lentes.
13. Ondes à charge spatiale.
14. Technique de mesure.
15. Technologie.

Tout renseignement concernant le Congrès peut être obtenu en s'adressant à l'adresse suivante : Congresbureau 4e Internationaal Congres Microgolfbuizen 1962, Postbus 62 ; Eindhoven, Pays-Bas.

4th International Congress on Microwave Tubes

Organized by the Nederlands Radiogenootschap (Netherlands U.R.S.I. National Committee) with the sponsorship of U.R.S.I.

The Hague, 3-7 September 1962

Considering the successful results of the international congresses on microwave tubes (Paris 1956, London 1958 and Munich 1960) the Nederlands Radiogenootschap NRG has gladly accepted the

task of organizing the 4th International Congress on Microwave Tubes 1962.

This congress, to which U.R.S.I. has offered her cooperation, is to be held in The Hague from the 3rd to 7th September 1962.

The Preparatory Committee now has the pleasure of sending invitations for participation to all those who take an interest in research, development and the application of microwave tubes.

The Preparatory Committee also expresses the hope that many from all parts of the world will accept this invitation, so that in a truly international meeting an intense exchange of thoughts may be a valuable contribution to this branch of science and technology.

Provisional Programme

Monday, September 3. — a. m. : Official Opening Ceremony ;
— p. m. : Lectures and Discussions.

Tuesday to Thursday, September 4 to 6. — Lectures and Discussions.

Friday, September 7. — Excursions.

Lectures of 20 minutes at the most can be given in English, French or German, on one or more of the 15 subjects mentioned below :

1. Diodes and grid-controlled tubes.
2. Velocity-modulation tubes.
3. Travelling-wave tubes.
4. Backward-wave tubes.
5. Magnetrons and M-type amplifier tubes.
6. Parametric devices.
7. Gasdischarge devices.
8. Masers, irasers and lasers.
9. Tubes of special design (undulators, Cerenkov effect, harmonic generators, etc.).
10. Noise.
11. Electron mechanics (guns, focusing, etc.).
12. Cavities and slow-wave structures.
13. Space-charge waves.

14. Measuring techniques.
15. Technology.

Further information available by writing to : Congres Bureau 4e International Congres Microgolfbuizen 1962, Postbus 62, Eindhoven, Netherlands.

C.O.S.P.A.R.
Third International Space Science Symposium and C.O.S.P.A.R. Plenary Meeting

Washington, D. C., U. S. A. — April 38 - May 9, 1962

First circular and Announcement of two related Symposia to be held also in Washington, D. C. on « *Meteorological Uses of Rockets and Satellites* », April 23-25, 1962 « *Use of Artificial Satellites for Geodesy* », April 26-28, 1962.

Symposium on Meteorological Uses of Rockets and Satellites

April 23-25, 1962 in Washington, D. C.

Organizing bodies : World Meteorological Organization (W.M.O.) ; International Union of Geodesy and Geophysics (I.U.G.G.) ; Committee on Space Research (C.O.S.P.A.R.).

Program committee : H. Wexler, W. L. Godson and R. Frith.

Topics : Design and performance of rockets ; telemetry ; description of specific programs and results ; cloud cover experiments ; reduction, interpretation and use of data ; possibilities for future consideration.

Information : Further information may be obtained from the members of the Program Committee or from the C.O.S.P.A.R. Secretariat.

Symposium on the Use of Artificial Satellites for Geodesy

April 26-28, 1962 in Washington, D.C.

Organizing bodies : International Association of Geodesy (I.A.G.) Committee on Space Research (C.O.S.P.A.R.).

Program committee : W. KAULA (*Chairman*), N.A.S.A. Headquarters, Washington, D. C., U. S. A. ; J. BOULANGER, G. M. CLEMENCE, A. J. COOK, W. MARKOWITZ, A. G. MASSEVITCH, F. WHIPPLE and J. D. ZHONGOLOVITCH.

Topics : Studies in geodesy as they relate to the satellite program : dynamic and geometric applications ; orbital problems of celestial mechanics, observational programs for optical and radio tracking ; international participation ; data reduction.

Information : Further information may be obtained from the Chairman of the Program Committee or the C.O.S.P.A.R. Secretariat.

C.O.S.P.A.R. Plenary Meeting and Working Group sessions

APRIL 30, MAY 1, 4 AND 9, 1962 IN WASHINGTON, D. C.

The full C.O.S.P.A.R., its Executive Council and its various Working Groups will conduct sessions before, during and after the Third International Space Science Symposium. These sessions will be open to members of these bodies and invited advisors.

The provisional schedule of meetings of C.O.S.P.A.R. and its Working Groups is as follows :

April 30 — Executive Council and Working Groups.
May 1 — C.O.S.P.A.R. Plenary Meeting-National Reports.
May 4 — Executive Council and Working Groups.
May 9 — C.O.S.P.A.R. Plenary Meeting.

Third International Space Science Symposium

MAY 1, 2, 3, 7 AND 8, 1962 IN WASHINGTON, D. C.

This Symposium is being organized by C.O.S.P.A.R. The Program Committee consists of H. C. van de HULST (*Chairman*), J. BARTELS, H. FRIEDMAN, L. GOLDBERG, U. D. KALININ, A. G. MASSEVITCH and B. ROSSI.

The Symposium will comprise six sessions as follows :

SESSION I (1 day) : *Upper Atmosphere and Exosphere of the Earth and Relationship to Solar Disturbances.* — Chemistry and dynamics of the upper atmosphere ; absorption and propagation studies ; magnetic field ; radiation belts.

SESSION II (1 day) : *The Sun and the Interplanetary Medium.* — Experimental and theoretical studies of interplanetary plasma clouds ; propagation of solar galactic cosmic rays ; solar ultra-violet and X-ray emissions.

SESSION III (½ day) : *The Moon and the Planets.* —

SESSION IV (½ day) : *Galactic and Extra-Galactic Astronomy.* — Results of ultra-violet and gamma-ray measurements from balloons, rockets and satellites ; preparations for astronomical satellites.

SESSION V (½ day) : *Life Sciences.* — Review papers on the effect of space environment on man and other living organisms including the problem of radiation protection ; review papers on extra-terrestrial life and ways to detect it.

SESSION VI (½ day) : *Technologies of Space Research.* — Mainly tracking and communication problems.

Further information are available at the Secretariat of C.O.S.P.A.R. : 28, Nieuwe Schoolstraat, The Hague.

INTER-UNION COMMITTEES

Radio Meteorology

Reflections on the April 1961 Meeting of the Inter-Union Committee on Radio Meteorology

by J. S. MARSHALL
Chairman of the Committee

1. — REFRACTIVE INDEX AND MICROWAVE PROPAGATION

The primary interest of the majority of the committees is the pattern of refractive index in the atmosphere, created by variations in temperature and in the concentration of water vapour. This interest, in turn, is principally in relation to microwave propagation. Motivation of members and the scientists they represent is not so much the practical drive to achieve better communication links as it is a scientific curiosity as to propagation mechanisms and still more as to the structure and processes of the atmosphere involved in those mechanisms. It is felt that propagation studies can and should reveal the physics of the atmosphere. Techniques and tools for studying the pattern of refractive index extend from propagation links through sensitive zenith-pointing radars to refractometers and short-period temperature and humidity sensors. All these have limitations, naturally. The finest scale to which refractometers and the like respond may not be fine enough for the complete and direct relevance of the information they provide to the scattering that is an important matter in propagation. Radar returns are likely to come from a pattern that is fine-scaled in comparison with the pulse-length. This would prevent radar from providing explicitly the relevant microstructure. Again, radar returns are likely to come from various kinds of wild life, and birds and bees, for example, are liable to congregate in patterns that are related to atmospheric convection. This can make it very difficult to sort out the purely physical phenomena from

the quasi-biological. The relationship between radar back-scatter and the forward-scatter relevant to propagation is quite different for insects (and raindrops) from what it is for variations in refractive index. Finally, in piecing together the pattern of refractive index from the information provided by these limited sensors, it is most important that the three-dimensional pattern be considered (and time, too, as an important fourth dimension) and that the inherently anisotropic nature of atmospheric processes, including turbulence, not be overlooked.

Students of tropospheric propagation recognize the significance to them of theoretical studies of turbulence, and show an awareness of the limitations of laboratory studies of turbulence ; but should perhaps become more familiar with studies of atmospheric turbulence made with terms of reference other than radio. They would probably be helped too by a greater awareness of work that has been done on convection in the atmosphere ; they would certainly be helped if further work were done, to establish a better knowledge than now exists of convective circulation.

Climatology exists within meteorology, as a distinctive feature. It has its own important applications, but also it is a vital and essential part of the purely scientific description of the atmosphere. In this latter regard, it is important that lively bonds be maintained between climatology and the rest of meteorology. The committee has been shown most lucidly the nature of radio climatology. Its relationship to radio meteorology would seem to parallel that of climatology to meteorology, and the well-being of that relationship would seem to involve similar problems, towards which this committee should remain alert and responsible. It may be noted that while the radio climatology of which the committee heard was a climatology of refractive index, there are climatological problems also in connection with precipitation and also with lightning. These are meteorological items to which radio and radar are relevant, as will appear in subsequent paragraphs, and the relevance opens up climatological needs and climatological possibilities.

2. — Precipitation and Weather Radar

Radar at a wavelength of 10 cm or a little less reveals the pattern of precipitation in the atmosphere in these spatial dimensions,

and time and intensity. The radio meteorologist has two tasks related to this : the development of weather radar techniques and equipment for operational use by meteorologists, and the research use by the radio meteorologist himself to study the physical processes of clouds, and particularly the precipitation process. Whilst one need not be a radio meteorologist to use weather radar operationally, it is necessary to be one to make the most of the same techniques in meteorological research. Additionally to the intensity of precipitation, radar can reveal its motion by Doppler techniques, its turbulent motion by signal fluctuations, its particle-shape and orientation by polarization techniques, and so forth. Much more technical effort is demanded for the information obtained by these more specialized techniques. Again, the same back-scattering that reveals precipitation also reveals cloud, but at signal levels lower by about 60 dB, so that the operation is more limited and more difficult, and becomes insignificant in the presence of even small amounts of precipitation. Back-scattering also reveals some facets of the pattern of refractive index. These signals too are relatively weak, but the complicating target is less likely to be precipitation than it is birds and insects, as mentioned above.

Where the area of physical meteorology most relevant to the pattern of refractive index is turbulent and convective mixing, the area to which weather radar is most relevant is cloud physics. Weather radar has led a number of physicists and meteorologists into this subject, and the integration of the technique into the field of study is reasonably good.

The greatest attenuation of microwave signals in the troposphere is caused by rain. Weather radar is seriously affected by this attenuation at wavelengths less than 6 cm, the effect increasing with decreasing wavelength. Weather radar can provide the information for a climatology of precipitation pattern, and a major use of this climatology would be with regard to microwave attenuation.

3. — Lightning

Radio signals from lightning discharges have been studied since the earliest days of radio. They serve to locate the discharge and give evidence as to its nature. It should be possible to exploit

them more effectively now in conjunction with techniques more recently developed. Radars of wavelength 10 cm and longer record lightning in two different ways : by radio signals at the frequency to which the radar is tuned, and by radar returns from ionisation produced by the discharge — specifically, in Dr. Hewitt's view, from the so-called junction streamers. Traditionally, studies of the lightning discharge have been coupled with those of fair-weather fields and ionisation under the heading « atmospheric electricity ». There is nothing wrong with this, but strong connections maintained with weather radar and cloud physics generally would be helpful. The study of electrostatic fields of thunderstorms should in any case be kept close to radio studies.

4. — Radiometers, Satellites and Space Probes

Three topics raised as relevant to radio meteorology all have connotations of space science.

(1) *Microwave Radiometers* give temperature indications varying with the atmosphere through which they look, the apparent temperature rising with the amounts of attenuating substance : vapour, water cloud and rain (and not varying significantly with the temperatures of these substances).

(2) *Tiros Satellites* provide in their cloud pictures a kind of information that might usefully be compared with and related to all kinds of radiometeorological data. Satellite-based weather radars are probably practicable, and merit an awareness on the part of the committee.

(3) Rocket-launched probes to investigate other planets and their atmospheres are now being planned. Radio methods will be used for some of the measurements of the characteristics of the atmospheres. The committee would serve an important function (as Dr. Waterman pointed out) by calling to the attention of those involved the interplay of two disciplines in such work.

5. — Summary in terms of patterns

Five patterns in the atmosphere revealed by radio techniques are :

(i) The pattern of microwave refractive index (a function of temperature and water vapour). It is revealed by radio propagation links, also by radar, by refractometer and by

temperature and humidity sensors. Microwave radiometers can indicate water vapour, integrated along the path, in the absence of cloud and precipitation, Variations in refractive index which are very small by other standards can produce considerable effects on propagation links through bending, reflection and forward scatter. The patterns are mostly created by turbulence, by convective circulation, and by processes studied under the heading of « micrometeorology ».

(ii) The pattern of precipitation, revealed by radar through incoherent back-scattering. The effect of this scattering on propagation is relatively small, because it is approximately isotropic. Attenuation by precipitation is considerable at wavelengths less than 6 cm, however : it thus constitutes an alternative sensing technique, but is more important as a limitation to the radar technique and to communication links. The patterns of precipitation are created by the processes of cloud formation and precipitation, making cloud physics and severe storm studies the most relevant areas of meteorology. Convective circulation and processes studied under the heading « mesometeorology » are involved.

(iii) The pattern of lightning discharge, revealed by radio reception of signals generated by the discharge at all frequencies, and by radar returns, the targets for which last only a fraction of a second. The relevant areas of meteorology are much the same as for the pattern of precipitation, although traditionally lightning and thunderstorm electricity have been coupled with fair-weather atmospheric electricity.

(iv) The pattern of cloud is revealed by radar, but with signals about 60 *dB* weaker than precipitation, so that the technique is more demanding, and limited to situations where there is no precipitation (except that returns from traces of precipitation provide one technique for cloud study). Microwave radiometers can indicate cloud amount, integrated along the path, in the absence of precipitation ; relative sensitivity is less weighted toward rain in this (attenuation) case than in the back-scatter involved in radar. Photographs from Tiros satellites reveal cloud pattern in a form which could be related very usefully to radio propagation, precipitation and lightning patterns.

(v) The patterns of birds and insects in the atmosphere are revealed by radar, helpfully to some biologists but most unhelpfully to those using radar for index of refraction studies, because these patterns tend to have correlations with the same meteorological parameters, notably convective circulation, as do variations in refractive index.

C. C. I. R.

Réunions

Des réunions de Commissions d'Etudes du C.C.I.R. auront lieu en 1962 à Genève :

II. — (Récepteurs) — Rapporteur principal : M. P. DAVID, du lundi 7 au vendredi 18 mai inclus.

V. — (Propagation, compte tenu des effets dus à la terre et à la troposphère) — Rapporteur principal : Dr. R. L. SMITH-ROSE, du mercredi 25 avril au vendredi 4 mai inclus.

VI. — (Propagation ionosphérique) — Rapporteur principal : Dr. D. K. BAILEY, du lundi 7 au mercredi 23 mai inclus.

VII. — (Fréquences étalon et signaux horaires) — Rapporteur principal : M. B. DECAUX, du mercredi 25 avril au vendredi 4 mai inclus.

C. C. I. R.

Meetings

Meetings of the following C.C.I.R. Study Groups will be held in 1962 in Geneva :

II. — (Receivers) — Chairman : Mr. P. DAVID, from Monday, 7 to Friday, 18 May, inclusive.

V. — (Propagation, including the effects of earth and troposphere) — Chairman : Dr. R. L. SMITH-ROSE, from Wednesday, 25 April to Friday, 4 May, inclusive.

VI. — (Ionospheric propagation) — Chairman : Dr. D. K. BAILEY, from Monday, 7 to Wednesday 23 May, inclusive.

VII. — (Standard frequencies and time signals) — Chairman : Mr. B. DECAUX, from Wednesday, 25 April to Friday, 4 May, inclusive.

INTERNATIONAL GEOPHYSICAL YEAR

Annals of the I.G.Y.

Volume XI of the Annals has been issued. This volume contains the papers submitted to the following symposia held in Moscow from 30 July to August 8, 1958 : Meteorology, Numerical forecastings, Geomagnetism and Ionosphere, Aurora and Airglow, Ionosphere, Solar Activity, Cosmic Rays, Glaciology, Oceanography, Rockets and Satellites (see Vol. XII), Seismology, Nuclear Radiation.

The following papers were submitted to the Symposium on the Ionosphere :

— Preliminary investigations of the irregular structure of the ionosphere and of movements made at the stations of the Soviet Union during the period of the I.G.Y. (June 1957-July 1958), by L. W. GRISHKEVITCH, V. D. GOUSEV, J. V. KOUCHNEREVSKY, S. F. MIRKOTAN and E. G. PROCHKINE.

— Formations des hétérogénéités ionosphériques, by B. N. GERCHMAN and V. L. GINSBOURG.

— The distribution of true radiants of meteor bodies down to a definite limit of mass, by B. J. LEVIN.

— Radar observations of meteors in the U. S. S. R. under the I.G.Y. programme, by B. L. KASHCHEJEV.

— On long period troposphere-ionosphere regional connections and their synoptical relevation, by V. N. KESSENIKH.

— Early results from the equatorial close-spaced chain of ionospheric vertical sounding stations, by R. W. KNECHT and D. W. SCHLITT.

— Preliminary results from the U.S.-I.G.Y. Antarctic network of ionospheric vertical sounding stations, by R. W. KNECHT, R. E. MCDUFFIE and Y. AONO.

— Isoionic maps over the continental United States, by J. W. WRIGHT, T. E. VAN ZANDT and G. H. STONEHOCKER.

— The formation of an intermediate layer between E and F during night-time at Tsumeb, by W. DIEMINGER and W. ELLING.

— Electron density-height profiles from routine ionograms, by E. R. SCHMERLING.

— Ionospheric drifts at low frequencies, by G. S. SALES.

— Note on some preliminary results of ionospheric drift measurements on 245 kc/s at Kühlungsborn observatory, by E. A. LAUTER and J. SPRENGER.

— Note on significant S.I.D. recordings at low frequencies (150 to 300 kc/s) over great distances, by E. A. LAUTER.

— The morphology of spread-F, by R. W. WRIGHT, A. J. LYON and N. J. SKINNER.

— Horizontal drift measurements near the equator, by N. J. SKINNER, J. HOPE and R. W. WRIGHT.

— Quelques problèmes sur l'hétérogénéité statistique de l'ionosphère, by I. L. ALPERT.

— Artificial meteors into interplanetary space ? by F. ZWICKY.

I. C. S. U.

13th Meeting of the Executive Board

London, September 1961

The following decisions interesting U.R.S.I. were adopted by the meeting :

1. The Executive Board resolved that full consideration should be given to the question of abolishing the distinction between General and Specialised Unions, in consultation with Unions.

The Secretary General was asked to prepare a memorandum on this subject for the enlightenment of the Unions.

2. Scientific and Special Committees.

The Board accepted the following report drafted by a working group : « The Working Group suggests that the Executive Board of I.C.S.U. recognise that S.C.O.R., S.C.A.R. and C.O.S.P.A.R. have continuing responsibilities for which the title « Special Committee » is inappropriate. It therefore proposes that S.C.O.R. and S.C.A.R. be renamed « Scientific Committee on Oceanic Research » and « Scientific Committee on Antarctic Research », whereas C.O.S.P.A.R. retain its present name while being classed as a Scientific Committee.

Creation of future Scientific Committees or Special Committees should be the responsibility of the I.C.S.U. Executive Board.

The following criteria should be satisfied if a Scientific Committee is to be created :

1. The work of the Scientific Committee shall be of major interest to not less than three Scientific Unions.
2. The task of the Scientific Committee shall require the formation of a strong committee to carry out the programme involved.
3. The programme must be of a long term nature.

When the programme involved is of limited duration, but the first two criteria above are satisfied, a « Special Committee » should be formed for the task.

The Working Group recommends that the C.I.G. be regarded as a Special Committee, undertaking the following tasks :

a) to ensure the fulfilment of all I.G.Y. and I.G.C. 1959 obligations,

b) to be responsible for the International Year of the Quiet Sun.

The Working Group suggests that the Executive Board ask the C.I.G. to consider transferring responsibility for the World Magnetic Survey and the Upper Mantle Project to the International Union of Geodesy and Geophysics ».

3. Joint Commissions and Inter-Union Commissions.

The following text drafted by an ad hoc Sub-Committee was adopted by the Executive Board :

« 1. Joint Commissions and Inter-Union Commissions should in future be termed Inter-Union Commissions.

2. An Inter-Union Commission is formed on agreement between two or more Unions with notification to the Executive Board that their representation in a common Commission is desirable. Such an Inter-Union Commission is quite distinct from a Special Committee of I.C.S.U. in that it has no representation and no direct grants from national members. It will normally undertake the same type of work as Commissions of the participating Unions.

3. On agreeing to the formation of an Inter-Union Commission the Executive Board will nominate a Parent Union to draw up a constitution in consultation with the other participating Unions, and to take all necessary action to inaugurate the Commission.

4. The Parent Union will normally accept responsibility for financial support of the Inter-Union Commission, through arrangements with the other participating Unions and other agencies ; it will expect that consideration will be given to its commitments in the allocation of the Unesco Subvention.

5. The I.C.S.U. can, however, on the approval of the Executive Board, make a direct contribution to the finances of an Inter-Union Commission in which case it will adhere to the accounting procedures of the I.C.S.U. ».

4. How can I.C.S.U. best assist the work of the Unions ?

The following report by an ad hoc Sub-Committee was accepted by the Executive Board :

1. The I.C.S.U. and its Administrative Office, with a permanent administrative staff, can be of assistance to the Unions, which in general do not have such staff ; the Unions should freely request advice and assistance, and the Administrative Office should inform Unions as to the services that have been given and are available.
2. Acceptance of such services by the Unions is voluntary, and in no way affects the autonomy of the Unions.
3. Continuity of administration in the Unions, an whenever possible of representation on the Executive Board, is for this purpose most desirable.

4. It is envisaged that advice, assistance and common services will fall into the following broad divisions :

(*a*) Assistance with finance and accounting ; in particular assistance with « blocked » currencies and with temporary loans.

(*b*) Advice on legal, statutory, contractual, procedural and similar specialised matters.

(*c*) Liaison between the Unions and International Organisations (such as Unesco, W.M.O., I.A.E.A.) with particular reference to what contracts and agreements are possible.

(*d*) Assistance with visas for scientists attending meetings, and associated matters.

(*e*) Information and advice on publications, including recommended publishers and specimen contracts.

(*f*) Assistance, in appropriate cases, with administrative problems ; advice on administrative procedures.

(*g*) The collection and distribution of information about I.C.S.U. and Union activities.

Unesco Contacts

Abstracs from I.C.S.U. Information Bulletin - November 1961

Professor van Mieghem and A. E. Decae have contacted in October, independently, different personalities of the Department of Natural Sciences in Unesco House, Paris, such as Professor Kovda, Drs Roderick, Baez, Fournier d'Albe, Perez Vittoria, Batisse and the following points have been made by Unesco people :

1. — I.C.S.U. Future Structure

I.C.S.U. must become stronger or become a useless and sterile body. Active organizations are more and more wanted by governments, that are able to deal jointly with scientific, financial and administrative matters. I.C.S.U. must not remain a simple association of scientific unions, a club of scientists. It must learn to deal with governmental problems. Therefore it must have a stronger participation in its activities of National Members who are well used to interdisciplinary scientific fields and to dealings with officialdom. If I.C.S.U. insists to remain a purely academical body, another organization will certainly be created in the future of a more practical nature by governments — and I.C.S.U. will become a piece of museum.

A strong I.C.S.U., far from competing with Unesco, would on the contrary help it considerably in supplementing its programme in Natural Science, and in having more money appropriated for it. Unesco would see a better centralisation, in I.C.S.U., with Unions and Science Committees provided with permanent secretariats located in I.C.S.U. headquarters.

2. — F. A. G. S.

Unesco is conscious of a need of reorganization of the Permanent Services and would like to help. It is esteemed the Services need about $ 200,000 a year to work satisfactorily. Such a sum cannot obviously be provided by I.C.S.U. or Unesco. It must therefore come directly from Governments. To this end, F.A.G.S. ought to be reshaped into some sort of intergovernmental organization, with connections with Unesco, on a model similar to the Inter-

governmental Oceanographic Commission which is working quite satisfactorily.

For the time being, consideration is given to the establishment of an international computation center that could process all the services data. On the 1963 programme, money will be earmarked for an expert in electronic computation to visit all permanent services and determine best methods and machine type required. This machine could then be hired since models are evolving quickly. Professor van Mieghem thinks this machine ought to be able to take programmes written in a single logical language i. e. an I.B.M. machine ought to be able to read programmes written in Fortran.

The U. S. (Murphy) are decided in any case to create such a center, on a national basis, if not international, and are ready to collaborate, particularly in money, in such a creation.

The reorganization of the Services could then come after that, taking one Service at a time.

3. — Exchange of Scientists

Most of the scientists lack money for international exchange between laboratories. Unesco thinks each Union could select about 100 scientists a year in their own field to whom exchange facilities could best be granted, and give their names to Unesco administration to deal with material arrangements.

6. — I.C.S.U. Abstracting Board

In its 1963/64 programme Unesco is contemplating a considerably increased activity in the domains of abstracting. Dr. Perez Vittoria thinks I.A.B. ought to be given more means in order to achieve more homogeneity and standardization in the presentation of bibliographical information.

7. — I. Q. S. Y.

Unesco wishes that C.I.G. elaborates a first project of this programme at its April session. It is ready to help C.I.G. — create infrastructure similar to C.S.A.G.I.'s, organize data centers, deliver grants to research workers from underdeveloped countries.

8. — Space Research

Unesco is interested and disposed to help financially, all geophysical aspects of space research, nothing else. It is not concerned in space itself.

9. — Science Teaching

Dr. Baez, in charge of these questions, is interested in the preparation of source books for high school and university level. Some of these books have already been issued for high school level that have a great success and the project, first considered for physics, will be extended to mathematics, chemistry, geology, biology. It is up to the Unions to find competent people interested in these subjects and submit their names to Unesco.

Other studies undertaken by Dr. Baez include :

— Methods of Science Teaching for underdeveloped countries and for large audiences ;

— Teaching by self teaching books, teaching machines, television, etc., with contacts preserved between teachers and pupils ;

— Construction of new laboratories.

Comments are invited by Dr. Baez.

12. — Rationalisation of International Scientifics Meetings

Unesco is proposing that this question, which has been the object of reiterated requests from governments, be examined at the next I.C.S.U.-Unesco Committee, or that I.C.S.U. constitutes right away a working group charged with its study, and the establishment of certain rules the organization of meetings would have to abide by, according to resolution 2.113 of last Unesco. General Conference.

Important points concern particularly the geographical distribution of meetings, adequate publicity (especially for small ones), to ensure suitable participation and avoid duplication, their frequency, number of internal organization and the publication of their proceedings, in order that their efficiency be increased.

13. — Invitation of Unions to Unesco Advisory Committee

This question will be raised in 1963, and Unesco is contemplating inviting to Advisory Committee to consider scientific programmes,

presidents and secretary-generals of the Unions of Geophysics, Biology, Geology, Geography and Chemistry (since Chemistry may be on Unesco programmes after 1963).

Special Committee on Antarctic Research

Abstracts of minutes of the Plenary Session of 7 October 1961 at Wellington, New Zealand

PRESENT :

Delegates : R. PANZARINI (Argentina), K. E. BULLEN (Australia), Gino BUCCHI C. (Chile), C. LORIUS (France), T. NAGATA (Japan), E. I. ROBERTSON (New Zealand), T. GJELSVIK (Norway), S. A. ENGELBRECHT (South Africa), G. DE Q. ROBIN (United Kingdom), H. WEXLER (U. S. A.), E. J. GODLEY (I. U. B. S.), G. R. LACLAVERE (I.U.G.G.), R. H. WHEELER (I.G.U.), C. ELLYETT (U.R.S.I.), H. M. PANTIN (I.U.P.A.C.).

Observers : M. A. F. BARNETT (W.M.O.), J. W. BRODIE (S.C.O.R.), F. JACKA (C.O.S.P.A.R.), R. W. WILLETT (I.U.G.S.).

Advisers : J. M. COHEN, O. SCHNEIDER (Argentina) ; W. R. BAIRD, R. CARRICK, W. J. GIBBS, F. JACKA, B. P. LAMBERT, P. G. LAW (Australia) ; R. J. BOST, A. LEBEAU, J. PREVOST, P. C. ROLLAND, PAUL-EMILE VICTOR, J. ALT (France) ; T. TORII, H. UYEDA (Japan) ; J. W. BRODIE, J. DICKIE, T. R. CLARKSON, R. H. CLARK, C. ELLYETT, R. A. FALLA, R. P. GOUGH, M. GADSDEN, T. HATHERTON, G. W. MARKHAM, J. HOLMES MILLER, R. G. SIMMERS, W. H. WARD (New Zealand) ; C. G. HIDE, F. C. TRUTER, W. C. WATSON (South Africa) ; Sir Vivian FUCHS, A. H. SHEFFIELD, B. STONEHOUSE (United Kingdom) ; D. K. BAILEY, R. C. CROSS, T. I. GRAY, A. B. FORD, T. O. JONES, J. M. JONES, K. RODAHL, C. SWITHINBANK, P. SIPLE, D. M. TYREE, G. D. WHITMORE, R. C. PEAVEY (U. S. A.).

1. — PRESIDENT'S OPENING REMARKS

The President pointed out that two factors made the fifth meeting of S.C.A.R. of special importance. Firstly, the meeting followed closely on the ratification of the Antarctic Treaty and

the subsequent Consultative meeting held in Canberra. Secondly, it followed the garanting of recognition and support by the Ninth General Assembly of the International Council of Scientific Unions, for the International Year of the Quiet Sun (I.Q.S.Y.), the Upper Mantle Project (U.M.P.), the World Magnetic Survey (W.M.S.), the International Biological Project (I.B.P.), and the General Bathymetric Chart of the Oceans (G.E.B.C.O.).

The President reported that I.C.S.U. has set up a committee to consider the future structure of its own organisation in view of its increasing responsibilities. He said that S.C.A.R. should take note and pass any comments on its own position within the I.C.S.U. structure to this Committee. The Executive Board of I.C.S.U. had already decided that the name « Special Committee » was no longer appropriate for Committees which had long term responsibilities, but that such Committees should be renamed « Scientific Committees ». S.C.A.R., has therefore, become the « Scientific Committee on Antarctic Research ». The field of work of S.C.A.R. would remain the same, although the question of contact with Medical Research Workers through an appropriate international organisation should be considered by the working group on biology.

2. — Agenda

The meeting agreed to add to the agenda the question of representation on S.C.A.R. of the International Union of Geological Sciences (I.U.G.S.), the International Union of Physiological Sciences (I.U.P.S.), and the World Meteorological Organisation (W.M.O.).

3. — Working Groups

The secretary outlined the principal tasks of the working groups, presented draft lists of membership of the groups and a draft timetable, which were adopted after minor modifications.

4. — Minutes of Fourth Meeting

The minutes of the fourth meeting of S.C.A.R. were approved.

5. — Financial Report

Consideration of S.C.A.R. accounts and estimates was referred to the finance Sub-Committee. The secretary asked that they consider increasing the finance available for secretarial assistance. The President expressed his support for this request.

The secretary asked delegates to consider the possibility of providing financial assistance for representatives of scientific unions attending S.C.A.R. meetings, in order to make continuity of representation possible. He suggested that S.C.A.R. might offer to pay half the expenses of such delegates if finance became available.

7. — The International Year of the Quiet Sun

This was referred to the working group on Upper Atmosphere Physics.

13. — Communications

Mr. Sheffield reported that communications with Antarctica have improved during the past year. A useful preliminary meeting of the working group had been held at the I.A.A.C. in Melbourne on 5th and 6th October.

It was agreed that working groups should assess communication needs for their disciplines and report these to the working group on Communications.

16. — Logistics

The working group was asked to consider the calling of a symposium on logistics as proposed by the fourth meeting of S.C.A.R., but subsequently postponed, in the light of the recommendation of the Canberra Consultative meeting to consider organising a similar symposium. The need for the continued functioning of a S.C.A.R. working group on Logistics was also discussed, the final recommendations on both items were left to the working group. It was agreed to hold a joint meeting with the working group on Communications.

20. — Upper Atmosphere Physics

It was agreed that cosmic rays be included in the discussions of the working group. Views on ionospheric research expressed

through the Soviet Committee on Antarctic Research were substantially in agreement with existing proposals of S.C.A.R. in this field. Guidance was needed on how best to implement decisions of S.C.A.R. concerning the auroral material to be sent to world data centres. The need to co-ordinate plans and decisions with those of scientific unions and international projects was stated, and individual advisers were asked to see that S.C.A.R. proposals were not overlooked in any discussions in which they might take part.

22. — Relationship of S.C.A.R. with Governments

No change in relation had resulted from the Consultative meeting of the Antarctic treaty powers in Canberra in July 1961. The existing channel for communications is that S.C.A.R. can ask National Committees on Antarctic Research to pass recommendations through their scientific academies to their own Governments.

23. — Secretary

Dr. Robin was re-elected as the Secretary of S.C.A.R. for a further period of three years.

26. — Membership of S.C.A.R.

The question of admitting delegates to S.C.A.R. from the International Union of Geological Sciences (I.U.G.S.), the International Union of Physiological Sciences (I.U.P.S.), and the World Meteorological Organisation (W.M.O.) was reviewed. Membership of the International Union of Geological Sciences was approved and the Executive Committee were given authority to approve the membership of the International Union of Physiological Sciences if they submitted a formal application. The meeting also welcomed the idea that the World Meteorological Organisation should appoint a full delegate to S.C.A.R. Since this will require a special modification to the Constitution of S.C.A.R., the Executive Committee were asked to request the Executive Board of I.C.S.U. to approve the necessary change.

INTERNATIONAL ASTRONOMICAL UNION

Eleventh General Assembly

At the Eleventh Assembly of the I.A.U., the *Executive Committee* was constituted as follows :

President : V. A. AMBARTSUMIAN.

Vice-Presidents : L. GOLDBERG, Y. HAGIHARA, G. HARO, R. M. PETRIE, B. STERNBERK, R. H. STOY.

General Secretary : D. H. SADLER.

Professor J. H. OORT, retiring President, continues to serve in an advisory capacity.

The Executive Committee appointed as Assistant General Secretary : Dr. J. C. PECKER, Observatoire de Paris, Section d'Astrophysique, Meudon (Seine et Oise), France.

Commission 40 *on Radio Astronomy* has the following membership :

President : Dr. J. F. DENISSE, Observatoire de Paris, Section d'Astrophysique, Meudon (Seine et Oise), France.

Vice-President : Dr. R. HANBURY-BROWN, Nuffield Radio Astronomy Laboratories, Jodrell Bank, Macclesfield, Cheshire, England.

Organizing Committee : R. N. BRACEWELL, C. H. MAYER, V. V. VITKEVITCH, G. WESTERHOUT, J. P. WILD.

Members : BALDWIN, BALTA, BARRETT, BERKNER, BLUM, BOISCHOT, BOLTON, BURBIDGE (G. R.), CARR, CHRISTIANSEN, CHVOJKOVA, COUTREZ, DAENE, DAVIES, DEWHIRST, DODSON-PRINCE, DRAKE, EDMONDSON, ELWERT, ERIKSEN, FIELD, FINDLAY, FIROR,

FOKKER, FRIEDMAN, GALT, GOLD, GORGOLEWSKI, GRAHL, HACHENBERG, HACK, HADDOCK, HAGEN, HARANG, HARROWER, HATANAKA, HEESCHEN, HEWISH, HEY, HILL, HOWARD (W. E.), KAHN, KAZES, KHAIKIN, KRAUS, KUNDU, LAFFINEUR, LETFUS, LILLEY, LITTLE (A. G.), LOCKE, LOVELL, MCCLAIN, MCGEE (R. X.), MCKINLEY, MACRAE, MACRIS, MCVITTIE, MANNINO, MAXWELL, MENON, MILLS, MINKOWSKI, MULLER (C. A.), OORT, OSTERBROCK, PAWSEY, PICK-GUTMANN, PRIESTER, RABBEN, RIGHINI, ROBERTS (J. A.), ROMANA PUJO, RYDBECK, RYLE, SANAMIAN, SEEGER, SHAKESHAFT, SHKLOVSKY, SIEDENTOPF, SIMON (P.), SLEE, SMERD, SMITH (A. G.) SMITH (F. G.), SMITH (HARLAN J.), STAHR, CARPENTER, STEINBERG, STRUVE, TAKAKURA, TOWNES, TUOMINEN, VAN DE HULST, VAN WOERDEN, WADE, WALSH, WEAVER, YEN.

Liste des Réunions de l'Organisation Météorologique Mondiale (O.M.M.)

intéressant les radioscientifiques 1961, 1962

(See English text on p. 55)

Date et lieu	Nom et but de la réunion
9-19 janvier Toronto	*Groupe de travail des codes de la Commission de météorologie synoptique.* Révision des codes météorologiques, compte tenu des propositions formulées et des besoins exprimés principalement par les organes constituants de l'O.M.M.

Date et lieu	Nom et but de la réunion
29 janvier - 16 février New Delhi	*Commission des instruments et méthodes d'observation — Troisième session.* Revision du Règlement technique et du Guide des instruments et des observations météorologiques. Examen des rapports des groupes de travail suivants : instruments hydrométéorologiques, stations météorologiques automatiques, utilisation du radar en météorologie, comparaison internationale des pluviomètres et des nivomètres, mesure de la neige, instruments météorologiques et méthodes d'observation aux aérodromes, hydrométrie, mesure de l'évaporation, mesure du rayonnement, comparaison des instruments aérologiques et mesure de l'électricité atmosphérique.
14 - 31 mars Addis Abeba	*Association régionale I (Afrique) — Troisième session.* Etude du réseau de stations météorologiques en Afrique. Examen des rapports des groupes de travail des télécommunications météorologiques, du rayonnement solaire, atmosphérique et terrestre, d'hydrométéorologie, de météorologie agricole, de la zone aride. Aspects régionaux de la météorologie aéronautique et maritime. Atlas climatique de l'Afrique.
Mars (juste avant la troisième session de la CMS) Washington (provisoire)	*Groupe de travail de l'utilisation, à des fins synoptiques, des données météorologiques recueillies par des satellites artificiels (Commission de météorologie synoptique).* Examen des types de données, présentant de l'intérêt pour la météorologie synoptique, que l'on peut s'attendre à recevoir des satellites artificiels ; besoins en code et en télécommunications en ce qui concerne l'échange de ces données.

Date et lieu	Nom et but de la réunion
26 mars - 20 avril Washington	*Commission de météorologie synoptique — Troisième session.* Rapports des groupes de travail suivants : codes ; réseaux (réseau de base, stations de base) ; télécommunications (système d'échange dans l'hémisphère Sud) ; méthodes de réduction de la pression ; définition des termes utilisés pour décrire l'intensité des phénomènes météorologiques ; analyse du champ de température et techniques de prévision des isothermes, des lignes de courant et des isotaques dans les tropiques ; guide des pratiques de météorologie synoptique ; utilisation, à des fins synoptiques, des données météorologiques recueillies par des satellites artificiels. Besoins en matière d'observation pour la météorologie synoptique, unités utilisées dans les messages météorologiques destinés à des échanges internationaux. Amendements aux dispositions du Règlement technique ayant trait à la météorologie synoptiqe.
23 - 25 avril Washington	*Colloque O.M.M./C.O.S.P.A.R./U.G.G.I. sur les satellites et les fusées météorologiques.* Etude des données météorologiques recueillies à l'aide de satellites et de fusées. Interprétation scientifique des données.
Milieu de 1962 (ou 1963) (provisoire)	*Association régionale III (Amérique du Sud) — Troisième session.* Etude du réseau de stations météorologiques en Amérique du Sud. Examen des rapports des groupes de travail suivants : télécommunications météorologiques, observations de navires, mesure du rayonnement, Atlas climatique de l'Amérique du Sud, problèmes hydrométéorologiques et activités de météorologie agricole.

Date et lieu	Nom et but de la réunion
15 - 27 octobre Bangkok	*Association régionale II (Asie) — Troisième session.* Etude du réseau météorologique en Asie. Examen du rapport du groupe de travail régional des télécommunications météorologiques, et des aspects régionaux des questions de météorologie maritime et de météorologie aéronautique. Etude des problèmes régionaux de climatologie et des aspects météorologiques des recherches sur la zone tropicale humide et la zone aride.
5 - 17 novembre Nouméa	*Association régionale V (Pacifique Sud-Ouest) — Troisième session.* Etude du réseau de stations météorologiques dans le Pacifique Sud-Ouest. Examen des rapports des groupes de travail suivants : télécommunications météorologiques, observations de navires, mesure du rayonnement, Atlas climatique du Pacifique Sud-Ouest, problèmes hydrométéorologiques et activités de météorologie agricole.
Fin 1962 Amérique centrale (provisoire)	*Association régionale IV (Amérique du nord et Amérique centrale) — Troisième session.* Etude du réseau de base de stations météorologiques en Amérique du Nord et en Amérique centrale. Examen des rapports d'activité du Comité pour l'étude des ouragans dans les Caraïbes orientales. Etude des télécommunications météorologiques dans la Région et dans les Régions limitrophes. Aspects régionaux des questions relatives à la météorologie maritime, à la météorologie aéronautique et à la climatologie.

List of Meetings of the World Meteorological Organization (W.M.O.)

of interest to Radio Scientists 1961, 1962

(Voir texte français p. 51)

Date and Place	Name and Purpose of Meeting
9-19 January Toronto	*Working Group on Code Problems of the Commission for Synoptic Meteorology.* Revision of meteorological codes in the light of proposals and requirements expressed mainly by constituent bodies of W.M.O.
29 January - 16 February New Delhi	*Commission for Instruments and Methods of Observation — Third Session.* Revision of the Technical Regulations and the Guide to Meteorological Instruments and Observing Practices. Reports of the working groups on : hydrometeorological instruments, automatic weather stations, the uses of radar in meteorology, the international comparison of precipitation gauges, snow measurements, meteorological instruments and methods of observation on aerodromes, hygrometry, evaporation measurement, radiation measurement, comparison of aerological instruments and the measurement of atmospheric electricity.
14 - 31 March Addis Ababa	*Regional Association I (Africa) — Third Session.* Study of meteorological observational network in Africa, examination of reports of working groups on : meteorological telecommunications, solar, atmospheric and terrestrial radiation, hydrometeorological activities in Africa, agricultural meteorology, arid zone problems. Regional aspects of aeronautical and maritime meteorology. Climatic Atlas for Africa.

Date and Place	Name and Purpose of Meeting
March (just before C.S.M.-III) Washington (tentative)	*Working Group on the synoptic use of meteorological data from artificial satellites of the Commission for Synoptic Meteorology.* Study of types of data appropriate for synoptic use which can be expected to be received from artificial satellites; codes and telecommunications requirements for their exchange.
26 March - 20 April Washington	*Commission for Synoptic Meteorology — Third Session.* Reports from the following working groups : Code problems, networks (basic network, basic stations), telecommunications (southern hemisphere exchange system), pressure reduction methods, definition of terms used to describe the intensity of meteorological phenomena, isotherm, analysis and isotherm, streamline and isotach prognostic techniques in the Tropics, guide to synoptic use of meteorological practices, synoptic use of meteorological data from artificial satellites. Observational requirements for synoptic meteorology, units used in meteorological reports for international exchanges. Amendments to the part of Technical Regulations concerning synoptic meteorology.
23 - 25 April Washington	*W.M.O./C.O.S.P.A.R./I.U.G.G. Joint Symposium on Meteorological Satellites and Rockets.* Review of meteorological data provided by satellites and rockets. Scientific interpretation of the data.
Mid-1962 (or 1963) (tentative)	*Regional Association III (South America) — Third Session.* Study of the meteorological observing network in South America. Examination of the reports of the working groups on meteorological telecommunications, ships, weather reports, radiation measurement, Climatic Atlas for South America, hydrometeorological questions and agrometeorological activities.

Date and Place	Name and Purpose of Meeting
15 - 27 October Bangkok	*Regional Association II (Asia) — Third Session.* Study of the meteorological network in Asia. Consideration of the report of the regional working group on meteorological telecommunications and of regional aspects of maritime and aeronautical meteorological questions. Study of regional climatological questions and the meteorological aspects of humid tropics and arid zone research.
5 - 17 November Noumea	*Regional Association V (South-West Pacific) — Third Session.* Study of the meteorological observing network in the South-West Pacific. Examination of the reports of the working groups on meteorological telecommunications, ships, weather reports, radiation measurement, Climatic Atlas for the South-West Pacific, hydrometeorological questions and agrometeorological activities.
End 1962 Central America (tentative)	*Regional Association IV (North and Central America) — Third Session.* Study of the basic network of weather stations in North and Central America. Examination of reports on the activities of the Eastern Caribbean Hurricane Committee. Consideration of meteorological telecommunications in the Region and bordering Regions. Regional aspects of questions relating to maritime meteorology, aeronautical meteorology and climatology.

COMMISSION ÉLECTROTECHNIQUE INTERNATIONALE

INTERNATIONAL ELECTROTECHNICAL COMMISSION

Modifications aux listes d'adresses
publiées dans le *Bulletin d'Information*
nº 125 (mars-avril 1961)

Modifications to the List of Addresses
published in *Information Bulletin*
nº 125 (March-April 1961)

Président-President : Prof. G. de ZVETEN, President of I.E.C., Utrechtseweg 310, Arnhem, Netherlands.

Ancien Président - Past President : Dr. I. HERLITZ, SVANTEGATAN 5, Västeras, Sweden.

COMITES NATIONAUX

NATIONAL COMMITTEES

Belgique-Belgium : *Président* : Général E. E. WIENER.

Chine (République Populaire de) (China (People's Republic of) : Chinese Electrical Engineering Association, *c/o* Administration of Electrical Manufacturing Industries, Outside of Fushing-Men, Peking, Tel. 6-7520, Cables « 3531 Peking ».

General Secretary : Mr. PAO KUO-PAO.

Deputy General Secretary : Mr. JEA LAI.

Grèce-Greece : Greek Electrotechnical Association, 30, rue Chalkokondylis, Athens, Tel. 534.31.

Chairman : Mr. G. PEZOPOULOS.

General Secretary : Mr. M. LEVAHIDES.

Pays-Bas-Netherlands : *Secretary* : Mr. H. LELE.
Tchécoslovaquie-Czechoslovakia : *Président* : Mr. Fr. KROVINA.

COMITES D'ETUDES

TECHNICAL COMMITTEES

N° 12 A — *Secrétaire-Secretary* : Mr. F. MAARLEVELD.

29 — *Secrétaire-Secretary* : Prof. Dr. C. W. KOSTEN.

39/48 — *Secrétaire-Secretary* : Mr. P. L. M. VAN BERKEL.

45 — *Président-Chairman* : Mr. J. AUZOUY (France) Inspecteur Général, Commissariat à l'Energie Atomique, 129, rue de l'Université, Paris XII^{e}.

46B,46C — Supprimer et remplacer par :

To delete and read :

46 — Cables, fils et guides d'ondes pour équipements de télécommunications.

Cables, wires and waveguides for telecommunication equipment.

Président-Chairman : Prof. Dr. W. DRUEY (Suisse), Büelweg 5, Wintherthur.

Secrétaire-Secretary : Obering. H. PETERS, Felten und Guilleaume, Carlswerk A. G., Abteilung TP/HF, Köln/Mülheim, Germany.

46A — Câbles pour fréquences radioélectriques et dispositifs accessoires RF cables and their accessories.

Président-Chairman : Prof. Dr. W. DRUEY (Suisse).

Secrétaire-Secretary : Mr. L. VAN ROOIJ (Netherlands).

46B — Guides d'ondes et dispositifs accessoires.

Président-Chairman : Dr. B. JOSEPHSON (Sweden), Research Institute for National Defence, Stockholm 80.

Secrétaire-Secretary : Mr. Tore ANDERSON, 159, Deer Path, Mountainside, New Jersey, U. S. A.

52 — *Président-Chairman* : Mr. L. VAN ROOIJ (Netherlands), Standards Engineers, N. V. Philips Gloeilampenfabrieken, Centrale Normalisatie, Eindhoven.

53 — *Président-Chairman* : Dr. A. B. CREDLE (U. S. A.), International Business Machines Corps., Ossining, New-York.

Secrétaire-Secretary : Mr. V. M. GRAHAM, Associate Director, Electronic Industries Association, 2260, Salmon Tower, 12, West 42nd Street, New-York, 36, N. Y.

A.C.E.T. — *Président-Chairman* : Prof. G. de ZOETEN (Netherlands), President of the I.E.C., Utrechtseweg 310, Arnhem.

Secrétariat : Bureau Central.

C.I.S.P.R. — *Président-Chairman* : Prof. L. MORREN (Belgique), Directeur, Laboratoire Central d'Electricité, 2, rue de la Vanne, Bruxelles 5.

FONDATION INTERNATIONALE BALZAN

(See English text on p. 64)

Le 16 novembre 1961 la Fondation Internationale Balzan commencera son activité par une cérémonie officielle qui aura lieu à Berne, dans la salle du Conseil national. Des hôtes de marque, suisses et étrangers, y prendront part.

Origine du fonds

Au début des années trente, l'ancien directeur administratif du « Corriere della Sera », Eugenio Balzan, cherche refuge en Suisse. Il est demeuré fidèle à ce pays jusqu'à sa mort. Sa fille, Madame Angela Lina Balzan, désirait accomplir le vœu, souvent exprimé par son père, de créer une grande œuvre durable, sociale et humanitaire. Pour honorer sa mémoire dignement elle prenait, en 1956 déjà, les premières dispositions en vue de créer une Fondation qui porterait le nom de « Prix Balzan » et s'inspirerait, dans ses grandes lignes, du Prix Nobel. Par la suite, elle légua à la Fondation la fortune que son père lui avait laissée. Les revenus de cette fortune doivent, par l'attribution annuelle de prix, soutenir, encourager et récompenser les efforts les plus méritoires dans le domaine humanitaire, artistique, social et scientifique. En principe, trois prix seront décernés annuellement,

a) un prix pour la paix et l'humanité ;

b) un prix de littérature, de philosophie et des arts ;

c) un prix des sciences (physique, chimie, technique et médecine).

Le nombre des prix peut, si le conseil de la Fondation le juge opportun, être élevé à quatre, exceptionnellement à cinq. S'il n'est décerné qu'un prix, il doit l'être pour la paix et l'humanité.

Pour l'organisation de la Fondation, les conseils prodigués par les personnalités dirigeantes de la Fondation Nobel furent extrêmement appréciés. Ces entretiens en commun ont démontré que la Fondation, sans entrer en rivalité avec la Fondation Nobel, la complétait sous maint rapport. Contrairement à la Fondation

Nobel, dont les prix doivent toujours être décernés pour la physique, la chimie, la médecine, la littérature et la paix, la Fondation Balzan dispose d'une certaine liberté de choix dans l'attribution des prix : elle peut en effet couronner également des travaux particulièrement méritoires dans le domaine de la recherche technique et des beaux-arts.

L'organisation de la Fondation

La fondatrice ayant fait gérer sa fortune en Suisse et exprimé le désir qu'il en fût de même après sa mort, le dédoublement de la direction dans la Fondation s'imposait. C'est l'origine du fractionnement de l'œuvre à créer avec la fortune Balzan en deux corps administratifs : l'un d'eux — la présente Fondation — s'occupe exclusivement de l'administration de la fortune, l'autre — la Fondation « Premi » —, en voie d'organisation, remet les prix aux lauréats qu'il aura désignés.

La disposition ordonnée par la fondatrice qui confère un caractère international à la Fondation n'a pas sa raison d'être par le seul fait que les prix sont décernés aux personnalités et collectivités les plus méritantes sans distinction de nationalité, d'origine, de race, de couleur et de religion mais aussi par la composition internationale du conseil de fondation. La « Fondation internationale Prix E. Balzan-Fonds » est placée sous la surveillance du Département fédéral de l'intérieur. Font partie du conseil de fondation le Père Enrico Zucca, Supérieur de l'Angelicum, Milan, président ; U. Mazzolini, avocat, Milan ; Ernst Faust, directeur, Brugg/A.G. ; Madame M. Barbieri, professeur, Pavie ; Aldo Danieli, colonel, San Remo. Le conseil comprend en outre un délégué de chacun des pays qui reconnaissent la Fondation.

Fonctionnent comme membres de la commission des finances : Philippe Etter, ancien conseiller fédéral, président et, dans l'ordre alphabétique, Hermann J. Abs, docteur h.-c., président de direction de la Deutsche Bank A.G., Francfort sur le Main, Jean Bourgknecht, conseiller fédéral, Berne, Giordano dell'Amore, professeur, président des caisses d'épargne des provinces lombardes, Milan, P. Giustiniani, ingénieur, délégué du conseil d'administration de la Società Montecatini, Milan, J. J. Kurz, directeur général du Crédit Suisse, Zurich, Franco Maspoli, conseiller national, Ch. Türler, président

de la direction générale de la Société de Banque Suisse, Bâle. M. Ernst Faust, directeur, fonctionne comme secrétaire de cette commission.

Les taches de la Fondation

La Fondation « Fonds », inscrite au registre du commerce du canton de Zurich, a pour but de réunir, de protéger et de gérer tout son patrimoine et met à disposition de la « Fondation internationale Prix E. Balzan-Premi » les moyens financiers qui lui permettent d'atteindre son but.

La Fondation « Premi », en voie d'organisation, sera dirigée par un haut comité international auquel les comités spéciaux nécessaires sont subordonnés. L'ancien président de la République italienne, M. Luigi Einaudi, est le président d'honneur du haut Comité. Font en outre partie du Comité MM. Vincenzo Arangio-Ruiz, président de l'Académie dei Lincei, Rome, président, H. P. Tschudi, conseiller fédéral, chef du Département fédéral de l'intérieur, Berne.

Le président de la Confédération suisse et le président de la République italienne sont, de droit, présidents d'honneur du Comité qui décerne les prix.

Les prix, distribués chaque année, sont constitués par un montant en espèces, un diplôme, une biographie d'Eugenio Balzan et une médaille d'or que l'actuel président du sénat italien, Cezare Merzagora, a conçue et qui représente les portraits d'Eugenio et d'Angela Lina Balzan.

Le prix de la Fondation Balzan sera décerné pour la première fois lors de la cérémonie officielle d'inauguration de l'activité de la Fondation qui aura lieu à Berne le 16 novembre ; des représentants de l'Italie et de la Suisse comme aussi d'autres pays, des personnalités des milieux internationaux diplomatiques, culturels et scientifiques y prendront part.

« FONDATION INTERNATIONALE BALZAN »

(Voir texte français p. 61)

On November 16, 1961, the Fondation Internationale Balzan will start its activities with an official ceremony which will take place in Bern in the Hall of National Council. Outstanding personalities, both Swiss and foreign, will participate.

The origin of the fund

In the early thirties, the former administrative director of « Corriere della Sera », Eugenio Balzan, found asylum in Switzerland. He remained faithful to his adopted country until his death. His daughter, Mrs Angela Lina Balzan, was eager to accomplish the wish often expressed by her father to found this lasting social and humanitarian undertaking. In this way his memory would be respected properly. She took the first steps in 1956 to create a Foundation with a concept like that of the Nobel Prize, which would be called the Balzan Prize. Consequently, she left the fortune inherited from her father to the Foundation. Every year, the proceeds of this Foundation encourage and sustain the most deserving efforts in the humanitarian, social, and scientific domain. Normally, three prizes will be awarded annually :

(*a*) For peace and humanity ;

(*b*) For literature, philosophy, and the arts ;

(*c*) For science (physics, chemistry, engineering and medicine).

If the Council so decides, the number of prizes can be increased to four or even to five. If only one prize is granted, it must be for contributions to peace and humanity.

The Foundation was set up with helpful advice of the directors of the Nobel Foundation. Because of this coordinated planning, the Balzan Foundation complements the Nobel Foundation in its scope. Unlike the Nobel Foundation, which can grant prizes only for physics, chemistry, medicine, literature, and peace, the

Balzan Foundation enjoys a certain freedom in awarding prizes. It is able to honour particularly deserving achievement in the field of engineering and the arts.

The organization of the Foundation

Mrs. Balzan managed her fortune in Switzerland and expressed the wish that this practice should continue after her death. A division within the directorate was necessary in order to adhere closely to this requirement, and two bodies were thereupon formed within the Administration : one of them, the present Foundation, deals exclusively with administration of the fortune, while the other, the Foundation « Premi », is in charge of delivering the prize to the finalists it has selected.

The requirement imposed by the founder gives an international character to the Foundation, not only on account of the fact that the prizes are to be awarded to the most deserving personalities or organizations without regard to their nationality, origin, race, colour, and religion, but also because of the international Balzan Foundation « Funds » are under the supervision of the Swiss Federal Department of the Interior. The members of the Council of the Foundation are Father Enrico Zucca, Superior of the Angelicum, Milan, President ; U. Mazzolini, lawyer, Milan ; Ernst Faust, manager, Brugg/A.G. ; Mrs. M. Barbieri, professor, Pavia ; and Colonel Aldo Danieli, San Remo. The Council consists, in addition, of delegates from all countries which recognize the Foundation.

The members of the Financial Commission are Philippe Etter, the former Federal Counsellor, President ; (in alphabetical order) Hermann J. Abs, Doctor h.c., Manager of the Deutsche Bank A.G., Frankfurt am Main ; Jean Bourgknecht, Federal Counsellor, Bern ; Giordano Dell'Amore, professor, President of Lombard Savings Banks, Milan ; P. Giustiniani, Engineer, delegate of the Board of directors of the Società Montecatini, Milan ; J. J. Kurz, General Manager of the Swiss Credit Bank, Zurich ; Franco Maspoli, National Counsellor, Mendrissio ; Ch. Türler, President of the General Management of Swiss Bank Corporation, Basle. Mr. Ernst Faust, Manager, assumes the function of Secretary of this Commission.

The tasks of the Foundation

The goal of the Foundation « Funds », as set out in the commercial register of the canton of Zurich, is to bring together, to protect and to handle all its assets, and to put at the disposal of the International Balzan Foundation « Premi », the necessary financial means.

The Foundation « Premi », in course of being set up, is handled by an international High Commission which directs whatever sub-Committees are necessary.

The former President of the Italian Republic, Mr. Luigi Einaudi, is the honorary President of the High Committee. Members of the Committee include MM. Vincenzo Arangio-Ruiz, President of the Academia dei Lincei, Rome, President; H. P. Tschudi, Federal Counsellor, Head of the Federal Department of the Interiors, Bern.

The President of the Swiss Confederation and the President of the Italian Republic are honorary Presidents of the Committee which awards the Prizes.

The prizes granted every year consist of certain amounts of money, a diploma, a biography of Eugenio Balzan, and a medal devised by the President of the Italian Senate, Cesare Merzagora, which represents the portraits of Eugenio and Angela Lina Balzan.

The first prize of the Balzan Foundation will be granted during inaugural ceremony of the Foundation which will take place in Bern on the 16th of November; representatives from Italy and Switzerland as well as well-known personalities from diplomatic, cultural and scientific circles of other nations will take part.

BIBLIOGRAPHIE

(See English text on p. 69)

Union Internationale des Télécommunications

L'U. I. T. vient de publier la *Carte des stations côtières ouvertes à la correspondance publique ou participant au service des opérations portuaires,* 8e *édition* 1961.

Cette nouvelle édition comporte, comme l'indique son nom, non seulement les stations côtières ouvertes à la correspondance publique comme cela a été le cas jusqu'à maintenant, mais aussi celles participant au service des opérations portuaires. Elle fera mention des derniers renseignements reçus pour publication dans la 1re édition de la Nomenclature des stations côtières (1er janvier 1961) en ce qui concerne les stations intéressées. La présentation de la nouvelle édition de la carte est identique à la précédente.

Elle comprend une carte-index et 10 feuilles se répartissant comme suit :

Feuille 1 : Europe septentrionale.
Feuille 2 : Europe occidentale.
Feuille 3 : Méditerranée.
Feuille 4 : Afrique, Inde, etc.
Feuille 5 : Mer de Chine, Archipel des Indes orientales.
Feuille 6 : Océanie.
Feuille 7 : Amérique du nord orientale.
Feuille 8 : Amérique du nord occidentale et Alaska.
Feuille 9 : Amérique du sud.
Feuille 10 : Calotte polaire, du pôle nord au 60° de latitude nord.

La couverture de cet atlas comporte le titre de la carte dans les cinq langues officielles de l'Union ; il en est de même pour les explications et la légende. Toutefois, afin de réduire le prix de revient dans toute la mesure du possible, les noms des pays sur les différentes feuilles ne figurent qu'en français.

Le prix de vente a été fixé à 3.70 *francs suisses* l'exemplaire ; ce prix comprend l'emballage et les frais de port pour envoi par la poste ordinaire dans le monde entier.

* * *

L'U.I.T. a également publié les tomes I*bis*, IV, VI et VII du Livre Rouge, préparés par le Comité consultatif international télégraphique et téléphonique (C.C.I.T.T.) à la suite de la IIe Assemblée plénière de cet organisme (New Delhi, décembre 1960).

Le tome Ibis contient :

— Les procès-verbaux et rapports de la IIe Assemblée plénière du C.C.I.T.T.

— Les Résolutions et Vœux émis par le C.C.I.T.T.

— Le Tableau général des Commissions et Sous-Commissions d'études pour la période 1961-1964.

— Le Tableau récapitulatif des questions à l'étude pendant la période 1961-1964.

— Le texte des Avis (série A) relatifs à l'organisation des travaux du C.C.I.T.T.

— Le texte des Avis (série B) et des Questions (Commission VII) relatifs aux moyens d'expression.

Le tome IV contient :

— Les Avis (séries M et N) et Questions (Commission IV) relatifs à la maintenance et aux mesures sur les lignes du réseau international.

Le tome VI contient :

— Les Avis (série Q) et Questions (Commissions XI, XIII et B) relatifs à la signalisation et à la commutation téléphoniques.

Le tome VII contient :

— Les Avis (séries R, S, T, U) et Questions (Commissions VIII, IX, X, XIV) relatifs à la technique télégraphique.

— Les Avis (série V) et Questions (Commission A) relatifs aux transmissions de données.

Chaque volume contient, pour son domaine, les extraits des contributions reçues pendant la période 1957-1960 qu'il a été reconnu utile de publier en raison de leur intérêt.

Ces documents ont été édités séparément en deux langues (française et anglaise). Le prix de vente, par exemplaire, a été fixé comme il suit :

— Tome I*bis* : 11,40 francs suisses (environ 190 pages).

— Tome IV : 16,25 francs suisses (environ 270 pages).

— Tome VI : 13,50 francs suisses (environ 220 pages).

— Tome VII : 30,45 francs suisses (environ 520 pages).

Ces prix comprennent l'emballage et les frais de port pour envoi par la poste ordinaire dans le monde entier.

La liste complète des publications de l'U.I.T., avec indication du prix de vente de chacune d'elles sera envoyée gratuitement sur demande adressée au Secrétariat général de l'U.I.T., Palais Wilson, Genève, Suisse.

BIBLIOGRAPHY

(Voir texte français p. 67)

International Telecommunication Union

The I.T.U. has published *the eighth edition* (1961) *of the Map of Coast Stations open for public correspondence or taking part in port operations.*

This new edition, as its name indicates, comprises stations taking part in port operations, as well as coast stations open for public correspondence, and hence represents an innovation. The latest information received for publication in the first List of Coast Stations (1 January, 1961) and relating to the stations concerned, is embodied. The lay-out is exactly the same as for the previous Map.

There is an index chart and ten sheets, as follows :

Sheet 1 : Northern Europe.
Sheet 2 : Western Europe.
Sheet 3 : Mediterranean.
Sheet 4 : Africa, India, etc.
Sheet 5 : China Sea, East Indies.
Sheet 6 : Oceania.
Sheet 7 : Eastern North America.
Sheet 8 : Western North America and Alaska.
Sheet 9 : South America.
Sheet 10 : the Polar Cap, from the North Pole to 60° N.

The cover carries the title of the Map in the five official I.T.U. languages. Explanations and legends, too, are in the five languages. But to save money, the names of countries, as shown on the sheets, are in French only.

The Map will cost 3.70 Swiss francs per copy, which figure includes carriage by ordinary mail to any address.

The I.T.U. has also published Volumes I*bis*, IV, VI and VII of the Red Book, prepared by the International Telegraph and Telephone Consultative Committee (C.C.I.T.T.) as the outcome of the IInd Plenary Assembly of the C.C.I.T.T. (New Delhi, December, 1960).

Volume Ibis contains :

— The minutes and reports of the IInd Plenary Assembly of the C.C.I.T.T. ;
— The Resolutions and Opinions issued by the C.C.I.T.T. ;
— The General Table of Study Groups and Sub-Study Groups for the period 1961-1964 ;

— A summary table of the questions under study in the 1961-1964 period ;

— Series A Recommendations, relative to the organization of C.C.I.T.T. work ;

— Series B Recommendations and Questions of Study Group VII, relative to means of expression.

— Series M and N Recommendations and Questions of Study Group IV relative to maintenance and measurements on lines of the internationa network.

Volume VI contains :

— Series Q Recommendations and the Questions of Study Groups XI, XIII and B, relative to telephone signalling and switching.

Volume VII contains :

— Series R, S, T and U Recommendations and the Questions of Study Groups VIII, IX, X and XIV, relative to telegraph technique ;

— Series V Recommendations and the Questions of Study Group A, relative to data transmission.

Each volume contains extracts from contributions to the subjects covered by it, received during the 1957-1960 period and considered to be worth publishing.

These documents have been published in two separate languages (French and English). The price per copy is as follows :

— Volume I*bis* : 11.40 Swiss francs (about 190 pages).

— Volume IV : 16.25 Swiss francs (about 270 pages).

— Volume VI : 13.50 Swiss francs (about 220 pages).

— Volume VII : 30.45 Swiss francs (about 520 pages).

The above prices include packing costs and carriage by ordinary mail to any address in the world.

A complete list of I.T.U. publications, with their prices, will be sent to you free of charge on request to the General Secretariat of the I.T.U., Palais Wilson, Geneva, Switzerland.

INTERNATIONAL COUNCIL OF SCIENTIFIC UNIONS

Inter-Union Committee for Frequency Allocations for Radio Astronomy and Space Science (U.R.S.I., I.A.U., C.O.S.P.A.R.)

Report of a meeting of the Committee held at the Royal Society, London, on Thursday and Friday, 19th and 20th October, 1961

PRESENT

Dr. J. F. Denisse (*Chairman*).
Mr. A. H. Cata,
Dr. R. Emberson,
Dr. J. P. Hagen,
Dr. A.P. Mitra,
Prof. J. H. Oort,
Mr. J. A. Ratcliffe (on 20th),
Dr. H. Sterky,
Prof. Dr. A. Unsöld,
Prof. H. C. van de Hulst,
Dr. R. L. Smith-Rose (*Secretary General*).

1. In opening the meeting, the Chairman welcomed those present at this, the first, meeting of the full Committee, which has been conducting its business by correspondence. As a reciprocal action for the Committee's participation in the work of C.C.I.R., Mr. A. H. Cata had been invited to attend the meeting of the Committee as a consultant.

The Secretary reported apologies he had received from Dr. V. Ilyin, Dr. V. V. Vitkevitch, Dr. J. D. H. van der Toorn, Prof. L. G. H. Huxley and from Mr. J. A. Ratcliffe who was unable to attend on the first day of the meeting.

2. — Meeting of Working Party.

On the preceding day, 18th October, the working party, comprising Dr. Denisse (*Chairman*), Professors Oort and van

de Hulst, and Dr. R. L. Smith-Rose, met to discuss the agenda for the full Committee meeting, and to review the progress made since the above members met in Brussels in March 1961 (see Doc. IUCAF/8). Part of this meeting was attended by Dr. J. W. Findlay (of the National Radio Astronomy Observatory, Green Bank, West Virginia) who gave an account of the West Ford activities being conducted under the auspices of the U. S. Space Science Board.

Other matters dealt with by the working party concerned the relationship of the Committee with I.T.U. and C.C.I.R., the submission of suitable recommendations to these bodies, and the attendance of representatives of the Committees at future international conferences.

Discussion of these subjects has been included in the appropriate items in the later paragraphs of this report.

3. — Report of Progress to 30th September, 1961.

The Committee accepted the Progress Report presented in Doc. IUCAF/18 ; and also noted the earlier review of the Committee's activities given in Doc. IUCAF/12, which had been presented by Dr. Smith-Rose at the General Assembly of I.C.S.U. held in London in September 1961. At this meeting, I.C.S.U. had approved the activities of the Committee during the past year, together with its Budgetary Estimate for the year 1962.

4. — Participation of the Committee in I.T.U. and C.C.I.R. Activities.

As reported in Doc. IUCAF/18, paragraph 3, the Committee has been admitted as a participating observer in the work of I.T.U. and C.C.I.R. Such participation will normally take place through C.C.I.R. Study Group IV which is responsible for Space Research and Radio Astronomy, as well as for the technical aspects of Space Communications generally. The first active result of this recognition was the representation of the Committee at the meeting of the European Broadcasting Conference at Stockholm. A report on this has been circulated as Doc. IUCAF/17.

An interim meeting of C.C.I.R. Study Group IV is to be held in Washington from 12th to 24th March, 1962, and it was agreed that the Committee should be formally represented there by the Chairman (Dr. Denisse) and Secretary General (Dr. Smith-Rose). Other

members who expected to attend the meeting were Drs Emberson, Hagen and Sterky, and possibly also Dr. van der Toorn.

5. West Ford.

During his brief visit, Dr. Findlay has referred to the experiments being conducted to ensure that the satellite carrying the « needles » achieved its correct resonant orbit. He also explained the difficulty of getting radio astronomers to participate in the experiments, since very few observatories had suitable equipment for making accurate observations at the resonant frequency of the dipoles (8000 Mc/s).

Further details of the proposed experiments are given in the following publications, which were distributed to the Committee :

(i) *I.G.Y. Bulletin*, n° 50, August 1961.

(ii) Reprint from « *Science* », October 1961, Vol. 134, pp. 973-9.

(iii) Report on Project West Ford (President's Scientific Advisory Committee).

The Committee also noted the two Resolutions adopted by the General Assembly of the International Astronomical Union (Berkeley, August 1961) ; and distributed in a communication to the Committee as Doc. IUCAF/23.

It was agreed that project West Ford came within the purview of the Committee, which should be kept informed of all developments, and be ready to co-operate in any action designed to protect the interests of both optical and radio astronomers.

6. — Space Experiments with Potentially Undesirable Effects.

The following Resolution under the above heading was adopted by the IXth General Assembly of the International Council of Scientific Unions at its meeting in London, September 1961.

> « The General Assembly considering that certain experiments conducted by means of space vehicles and contributing in an important way to the advancement of science may also affect present or future scientific activities in other fields ;
>
> *Invites* C.O.S.P.A.R. to examine any proposed experiments or other space activities that may have potentially undesirable effects on scientific activities and observations, to arrange for

careful, objective, quantitative studies and to make available to unions, academies and governments the facts and analyses needed by them for making wise and proper decisions concerning the proposed experiments ; and,

Appeals to all governments planning to launch space experiments which could possibly affect other scientific research adversely, to make available to I.C.S.U. in timely fashion the information and data about the proposed experiments necessary to make the desired studies. »

While it was realised that this Resolution is deemed to cover all kinds of undesirable effects, the Committee decided to encourage C.O.S.P.A.R. to take the appropriate action, and to enquire in what way the Committee could usefully assist in, for example, making calculations of the expected interference, etc., in order to provide the information sought by I.C.S.U.

7. — Recommendation to I.T.U.

The Committee considered a draft Recommendation referring to an Extraordinary Administrative Radio Conference in 1963, for communication to I.T.U. through national administrations. The document was revised to meet the requests of various members of the Committee, and has been circulated as IUCAF/24 (revised).

It was agreed that in its revised form the Recommendation should be distributed to all administrations under cover of a personal letter from Dr. Denisse, as Chairman of IUCAF, explaining the objectives of the Committee and seeking the support of national representatives in forwarding the Recommendation to the I.T.U.

It was further agreed that each member of IUCAF should forward the same Recommendation to his national chairmen of the three constituent bodies (U.R.S.I., I.A.U. and C.O.S.P.A.R.). Copies of all the covering letters should be sent to the Secretary-General of IUCAF.

8. — Protection of Frequencies for Radio Astronomy and Space Science.

The Committee noted the progress reported in Doc. IUCAF/18 towards the more effective protection of frequencies allocated to Radio Astronomy. It was considered that there was a need for more effective contacts between members of the Committee and the

appropriate scientists in various countries, and also with members of national administrations responsible for dealing with C.C.I.R. and I.T.U. matters in their own countries. There had been clear indications at the recent Stockholm conference that many delegates concerned with sound and television broadcasting developments in various European countries (for example, U. S. S. R. and Italy) were not informed by their own scientists on matters concerning radio astronomy and space research.

Among the steps that could be taken to improve this lack of liaison the following were mentioned :

(i) Prepare and publish articles in the I.T.U. Journal describing the needs of the scientists working in this field ;

(ii) Compile a list for publication of the positions and details of existing and projected radio astronomy observatories ;

(iii) Foster collaboration with other international organizations (for example, C.E.P.T., the Conference of European and Postal Telecommunications Administrations) to assist in obtaining the details in (ii) ;

(v) Supply I.F.R.B. with all relevant information to enable that Board to promote the interests and objects of the Committee at I.T.U. and C.C.I.R. ;

(iv) Request all appropriate national bodies to submit details of its requirements for frequencies for research in radio astronomy and space science ;

(vi) With the aid of the information collection under (ii), iii) and (v), an international request should be compiled of all frequencies in current use or planned for the future development of radio astronomical and space scientific research.

9. — National Contacts to be established by Committee members.

It was agreed that members of the Committee should share the responsibility of making direct contacts with national scientific bodies and the list given in Appendix II was drawn up for this purpose.

Mr. Catá mentioned that general articles by members of the Committee relating to its work would be welcomed for publication in the I.T.U. Journal. These could be used as a means of stressing

the importance of research as a forerunner to practical developments in the use of radio techniques.

10. — Protection of Frequencies for Radio Astronomy.

(i) 150-153 *Mc/s.* — Attention was drawn to footnote nº 286 (p. 68 of the Radio Regulations, 1959), stating that the band 150-153 Mc/s is allocated to the Radio Astronomy service in Region 1 only. It was decided to request that the footnote should be extended to Region 2, to cover the United States, and in particular the Radio Astronomical Observatory at Greenbank, Virginia. The Committee could expect support of this request by the U. S. Federal Communications Commission.

(ii) 322-329 *Mc/s* (*Deulerium Band*). — As noted in Doc. IUCAF/18, para. 5, the negotiations with the N.A.T.O. authorities had not so far proved very encouraging. Dr. Smith-Rose reported, however, that he was now taking up the matter with Dr. Dieminger (Chairman) and other members of the Avionics Panel of A.G.A.R.D. (Advisory Group for Aeronautical Research and Development), who appeared to be sympathetic with the aims of the Inter-Union Committee.

The Committee agreed that efforts should be continued to secure protection for observers seeking to identify Deuterium line radiation ; while it is clearly impracticable to change the central frequency of observation, it was considered that the band to be protected might be reduced to, say 326-328 Mc/s, if this would assist the negotiations.

On the matter of time-sharing with other services, it was agreed that the minimum practicable observation time needed by radio astronomers would be 5 hours daily, preferably at night, over a period of at least 12 months. To negotiate for any shorter periods would be uneconomic having regard to the precise and costly radio equipment required for the observation of the extremely weak radiation to be expected.

(iii) 406-410 *Mc/s* (*Region* 1) ; 404-410 *Mc/s* (*Regions* 2 *and* 3). — It was agreed that the band 406-410 Mc/s would suffice for Regions 2 and 3 as well as 1 ; and that the IUCAF, in making its request for better protection than was at present provided by the Regulations, judges it to be more important to obtain complete protection rather than to maintain the full band of 6 Mc/s.

The importance of securing adequate protection for the band 406-410 Mc/s was stressed on two points :

(*a*) the pursuit of radio astronomy required the facility of conducting observations at suitable intervals throughout the radio spectrum ; and

(*b*) elaborate equipment is being installed for use on this frequency in the Netherlands and in Australia, and some existing observatories such as Vigeron (Holland), Jodrell Bank (England) and Bologna (Italy) are already using these frequencies.

(iv) 606-614 *Mc/s.* — The band of frequencies 606-614 Mc/s corresponds to Channel nº 38 in the range of frequencies assigned to Television broadcasting in Europe. As a result of representations made by this Committee at the European Broadcasting Conference at Stockholm, May/June 1961, a Recommendation was adopted requesting national administrations to avoid as far as practicable the use of this channel in the development of their UHF broadcasting services (see Doc. IUCAF/17, Appendix I).

It was pointed out that in the U. S. A. the above frequency band had not yet been allocated to any television services ; and it was agreed that the matter should be taken up with the Federal Communications Commission through the National Academy of Sciences in Washington, with a view to seeking complete protection of the band 606-614 Mc/s for radio astronomy (1).

The Secretary General was requested to make a similar approach to the U. S. S. R. Academy of Science through Drs Ilyin and Vitkevitch. It was hoped that this action might be successful in securing the co-operation of other eastern states in Europe, who did not support the Stockholm Recommendation mentioned above.

Dr. Mitra said that India had already cleared this band of frequencies for radio astronomy.

It was agreed to ask Dr. Huxley and Dr. Hatanaka to approach the Australian and Japanese authorities respectively with a view to extending the protection of the band towards a world-wide basis.

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(1) A letter was sent to Dr. Bronk, President, National Academy of Sciences, on 30th October, 1961.

(v) 1400-1427 *Mc/s.* — It was noted that the European Broadcasting Conference at Stockholm (May/June 1961) had recommended that administrations should take all practicable precautions to ensure that harmonic radiations from stations operating in Channels 21 (470-478 Mc/s), 50 (702-710 Mc/s) and 51 (710-718 Mc/s) do not interfere with radio astronomy observations in the band 1400-1427 Mc/s (see Doc. IUCAF/17, Appendix II).

(vi) *Frequencies above* 1500 *Mc/s.* — Eleven bands of frequencies between 1660 and 31,500 Mc/s are listed in the Radio Regulations, 1959 (footnotes n^{os} 354, 365 and 405) as being available for radio astronomy on a shared basis with other services. The Committee agreed with the view that all the frequencies specified in these bands would be required in the future on a world-wide basis for radio astronomy.

11. — Protection of Frequencies for Space Research.

Mr. Catá agreed to make available to the Committee details of all requests made to I.F.R.B. for the use of frequencies for Space Research. Such requests have to be reported by 15th April, 1962.

Dr. Hagen stated that the U. S. A. authorities would submit to the Commitee details of the frequencies requested by N.A.S.A.

It was agreed that the U. S. S. R. authorities should similarly be asked to supply details of the frequencies they request for space research.

The Secretary General will co-ordinate all such information sent to him and distribute it to members of the Committee.

It was emphasized that since satellites usually follow orbits encircling the earth, all frequency allocations for transmission from such bodies must be on a world-wide basis, and thus applicable to Regions 1, 2 and 3 in the Radio Regulations.

(i) *Protection of the frequency band* 137-138 *Mc/s.* — Following Resolutions adopted at the Florence (April 1961) meeting of C.O.S.P.A.R. (see Appendix I of Document IUCAF/18), the proposed Recommendation to C.C.I.R., forming Appendix III of Doc. IUCAF/8, was revised and distributed to the Committee.

While it was agreed that this revised Recommendation should be submitted informally to the C.C.I.R. by the Secretary General, it was pointed out that, in accordance with paragraph 180, page 20,

of the International Telecommunication Convention (Geneva, 1959), it was necessary for the Recommendation to be supported by at least twelve members and associate members of the Union. This could be achieved by members of the Committee asking their national administrations to submit the Recommendation in its revised form to the Director of C.C.I.R., who would then circularize all national members to seek their support.

The matter would doubtless come before the interim meeting of C.C.I.R. Study Group IV at which the Committee would be represented (see paragraph 4 above). The Committee were informed that the U. S. A. national administration had submitted a proposal to Study Group IV to extend the frequency band under discussion to cover 136-138 Mc/s, but the Committee was doubtful if this would be accepted by users of the frequencies between 137 and 138 Mc/s (Fixed, Mobile and Aeronautical services).

12. — Definition.

The attention of the Committee was called to the use of the term « passive » applied to the Radio Astronomy Service when no man-made transmissions were involved. It was agreed, after discussion, that the Committee should not encourage a terminology whereby Radio Astronomy (exclusively passive, as defined in the I.T.U. Radio Regulations) would come into any danger of confusion with the so-called Radar-astronomy (which is active and can be a source of interference).

13. — Next Meeting of the Committee.

It was proposed that the next meeting of the Committee should take place on Wednesday and Thursday, 11th and 12th April, 1962, and that it might be possible to arrange for this to be held at the Royal Academy, Amsterdam.

November 1961.

R. L. Smith-Rose.

21 Tumblewood Road
Banstead - Surrey
England

APPENDIX I

First List of Documents distributed to members of the Inter-Union Committee for Frequency Allocations for Radio Astronomy and Space Science

Doc. IUCAF/1.	Constitution and Terms of Reference.
Doc. IUCAF/2.	Preliminary Conclusions.
Doc. IUCAF/3.	Report to Committee, dated 9th January, 1961.
Doc. IUCAF/4.	A Survey of the Frequencies Assigned to Radio Astronomy and Space Science in the Radio Regulations, Geneva, 1959.
Doc. IUCAF/5.	Letter dated 26th January, 1961, covering question R/3 « Service de Radioastronomie », received from the European Conference of Administrations of Postal and Telecommunication Services.
Doc. IUCAF/6.	Committee on Space Research — Statement Prepared for the I.T.U. Ordinary Administrative Radio-communication Conference, Geneva, 1959.
Doc. IUCAF/7.	Committee on Space Research — Excerpts from Report of the Ad-hoc Committee on the Peaceful Uses of Outer Space .
Doc. IUCAF/8.	Report of a Meeting of a Working Party, held at Office of U.R.S.I. in Brussels on 27th-28th March, 1961.
Doc. IUCAF/9.	Committee on Space Research, Letter to Members of C.O.S.P.A.R. Working Group 1, dated 29th March, 1961.
Doc. IUCAF/10.	« RADIO ASTRONOMY — A WINDOW ON THE UNIVERSE » by J. H. Oort, reprinted from the American Scientists, Vol. 58, June 1960.
Doc. IUCAF/11.	Report on the Tolerable Level of Interference in the Radio Astronomy Frequency Bands, with letter dated 29th May, 1961.

Doc. IUCAF/12. Report on Work of Committee, dated 25th June, 1961.

Doc. IUCAF/13. Report on Frequency Allocations for the Radio Astronomy Service — A Statement of Position.

Doc. IUCAF/14. Four Papers on Project West Ford, reprinted from the Astronomical Journal, April 1961.

Doc. IUCAF/15. Paper on « The Allocation of Radio Frequencies for scientific Research », reprinted from the I.C.S.U. Review, Vol. 3, 1961.

Doc. IUCAF/16. A Summary Report on Project West Ford — from the Space Science Board, National Academy of Sciences, U. S. A.

Doc. IUCAF/17. Report on the European Broadcasting Conference, Stockholm, May/June, 1961.

Doc. IUCAF/18. Progress Report on Work of Committee, dated 30th September, 1961.

Doc. IUCAF/19. Paper on « The Allocation of Frequencies for Experiments in Space Communications » by R. L. Smith-Rose, presented at U.R.S.I. Symposium on Space Communication Research, Paris, September, 1961.

Note. — Some of the above papers have been published in the *U.R.S.I. Information Bulletin*, as follows :

Bulletin nº 123, p. 131, Doc. IUCAF/1.
Bulletin nº 127, p. 12 , Doc. IUCAF/11.
Bulletin nº 127, p. 18, Doc. IUCAF/12.
Bulletin nº 128, p. 74, Doc. IUCAF/20.

See also « Protecting Frequencies for Radio Astronomy » by J. W. Findlay, Bulletin nº 124, p. 51.