Bulletin nº 152 Septembre-Octobre 1965

U. R. S. I.

TABLE DES MATIÈRES — CONTENTS

XV^{e} ASSEMBLÉE GÉNÉRALE

Le Comité Organisateur Allemand a envoyé aux Comités Nationaux de l'U.R.S.I., pour distribution, des exemplaires de la 1re *Annonce de l'Assemblée Générale.*

Les membres des Comités Nationaux qui désirent obtenir un exemplaire de la brochure sont invités à s'adresser à leur Comité National.

XVth GENERAL ASSEMBLY

The German General Arrangements Committee has sent to National Committees, for distribution, copies of the 1*st Announcement of the General Assembly.*

Members of National Committees wishing to obtain a copy of the booklet may apply to their National Committee.

COLLOQUE INTER-UNIONS SUR LA PHYSIQUE DES PHÉNOMÈNES SOLEIL-TERRE

Annonce provisoire

L'U.R.S.I., l'U.G.G.I., l'U.A.I. et le C.O.S.P.A.R. organisent en commun un Colloque sur la Physique des Phénomènes Soleil-Terre. Ce Colloque se tiendra à Belgrade au cours de la semaine du 29 août au 2 septembre 1966. Ci-dessous la liste des membres du Comité du Programme :

U.R.S.I. : H. G. Booker et J. A. Ratcliffe ;
U.G.G.I. : M. Nicolet et J. G. Roederer ;
U.A.I. : C. W. Allen et E. R. Mustel ;
C.O.S.P.A.R. : J. W. King.

L'accès au Colloque est ouvert à tous les chercheurs intéressés, qu'ils soient ou non membres de l'une des Unions organisatrices, et n'est pas subordonné à la présentation d'une communication.

Les principaux sujets qui seront traités au cours de ce Colloque sont donnés ci-dessous (des détails complémentaires peuvent être obtenus auprès des membres du Comité du Programme) :

— Les émissions de particules solaires et les champs magnétiques interplanétaires.
— L'interaction du plasma solaire avec le champ géomagnétique.
— Les particules énergétiques chargées dans la Magnétosphère.
— La température des particules neutres et chargées dans l'Ionosphère et la Magnétosphère.

Des communications spécialement sollicitées et se rapportant aux différents sujets à discuter lors du Colloque seront présentées par les personnalités suivantes : J. W. Dungey, J. V. Evans, K. I. Gringauz, V. A. Krassovsky, R. Lust, N. F. Ness, T. Obayashi, B. J. O'Brien, E. N. Parker et V. A. Troitskaya.

Les autres chercheurs désirant présenter une communication sont priés d'envoyer au plus tôt possible, et AU PLUS TARD POUR LE 31 MAI 1966, deux exemplaires du résumé de cette

communication (n'excédant pas les 300 mots) au Secrétaire du Comité du Programme (Dr. J. W. KING, Radio and Space Research Station, Ditton Park, Slough, Bucks., England). Les communications qui seront présentées à Belgrade seront sélectionnées par le Comité du Programme sur la base des résumés ci-dessus mentionnés.

Etant donné qu'un horaire plein est prévu, il ne sera pas possible d'accorder plus de dix minutes pour la présentation des communications autres que celles sollicitées.

Des renseignements concernant l'organisation du Colloque (y compris inscription, logement, etc.) peuvent être obtenus auprès du Président du Comité Organisateur (Dr. Ing. D. Bajić, U.R.S.I. Belgrade Symposium Committee, P. O. Box 356, Belgrade, Yugoslavia). Les frais d'inscription s'élèvent à 12 dollars (U. S. A.) et comprennent le paiement d'un volume qui contiendra les résumés de toutes les communications sélectionnées par le Comité du Programme et sera distribué au début du Colloque.

INTER-UNION SYMPOSIUM ON SOLAR-TERRESTRIAL PHYSICS

Brief interim announcement

U.R.S.I., U.G.G.I., U.I.A. and C.O.S.P.A.R. are jointly organizing a Symposium on Solar-Terrestrial Physics to be held in Belgrade during the week August 29 to September 2, 1966. The members of the programme committee are :

U.R.S.I. : H. G. BOOKER and J. A. RATCLIFFE ;
U.G.G.I. : M. NICOLET and J. G. ROEDERER ;
U.I.A. : C. W. ALLEN and E. R. MUSTEL ;
C.O.S.P.A.R. : J. W. KING.

Attendance at the Symposium will be open to all scientists interested, whether or not they are members of any of the organizing Unions, and will not be conditional on the presentation of a paper.

The major topics to be covered at the Symposium are listed below (and further detail may be obtained from the members of the programme committee) :

— Solar particle emissions and interplanetary magnetic fields.
— The interaction of solar plasma with the geomagnetic field.
— Energetic charged particles in the magnetosphere.
— The temperature of neutral and charged particles in the ionosphere and magnetosphere.

Specially invited review papers dealing with the major different subjects to be discussed at the Symposium have been commissioned and will be read by the following scientists : J. W. Dungey, J. V. Evans, K. I. Gringauz, V. A. Krassovsky, R. Lust, N. F. Ness, T. Obayashi, B. J. O'Brien, E. N. Parker and V. A. Troitskaya.

Other scientists wishing to read papers should send two copies of the abstract (not more than 300 words) to the Secretary of the programme committee (Dr. J. W. King, Radio and Space Research Station, Ditton Park, Slough, Bucks., England) as soon as possible, BUT NOT LATER THAN MAY 31, 1966. Papers for presen-

tation at Belgrade will be selected by the programme committee on the basis of their abstracts. A full programme is anticipated and it will not be possible to allocate more than ten minutes for the presentation of papers other than the invited papers.

Information about the organization of the Symposium (including registration and accommodation, etc.) should be obtained from the Chairman of the organizing committee (Dr. Ing. D. Bajic, U.R.S.I. Belgrade Symposium Committee, P. O. Box 356, Belgrade, Yugoslavia). The registration fee will be $ 12 (U. S. A.), and this fee will include payment for the book which will contain the abstracts of all papers selected by the programme committee and which will be distributed at the beginning of the Symposium.

XIVe ASSEMBLÉE GÉNÉRALE

Progress in Radio Science 1960-1963

Volume II. — Radio and Troposphere

Le Volume II de la série « Progress in Radio Science » est édité par F. Du Castel. Après un rapport du Président de la Commission II résumant et classant les diverses contributions contenues dans les rapports des Comités Nationaux, l'ouvrage donne un compte-rendu complet des activités de la Commission II durant la XIVe Assemblée Générale de l'U.R.S.I. à Tokyo en septembre 1963. Les sujets des discussions comprennent les modèles d'atmosphères et leur comparaison avec des données théoriques et pratiques sur la propagation, les problèmes de radioclimatologie (effets climatiques sur la propagation troposphérique, effets radiométorologiques sur la propagation au-dessus de la mer et des îles), l'influence de la topographie et de la végétation sur la propagation, l'influence de la troposphère sur les communications spatiales, la radiométéorologie et la physique des nuages ; les problèmes de la propagation des ondes millimétriques et submillimétriques.

Les discussions qui ont suivi les communications ainsi que les recommandations adoptées par la Commission II à la XIVe Assemblée Générale de l'U.R.S.I. figurent également dans l'ouvrage. Le compte-rendu de la session commune avec les Commissions III et IV et consacré au guidage des ondes radio est publié dans le volume IV de cette même série.

Le volume II est publié par Elsevier Publishing Company (Amsterdam, London, New-York). Des exemplaires gratuits ont été distribués aux Membres du Bureau, aux Présidents des Comités Nationaux ainsi qu'aux Membres de la Commission II. Des exemplaires supplémentaires peuvent être commandés par les Comités Nationaux au Secrétariat Général de l'U.R.S.I.

Volume VII. — Radioelectronics

Le volume VII de la série « Progress in Radio Science » est édité par R. E. Burgess. Dans ce volume, le Président de la Commission VII de l'U.R.S.I. fait rapport sur les activités de sa Commission dans le domaine de la radioélectronique durant le triennum 1960-1963 et donne sous la forme d'un tableau récapitulatif tous les sujets apparaissant dans les Rapports des Comités Nationaux reçus par lui au moment de la rédaction de son rapport, ainsi que des conclusions que l'on peut en tirer.

L'ouvrage contient aussi les communications ou résumés de communications présentées lors des réunions de la Commission VII au cours de la XIVe Assemblée Générale de l'U.R.S.I. à Tokyo, en septembre 1963. Deux sessions furent consacrées à la physique des plasmas, l'une à l'étude des plasmas à l'échelle géophysique et astrophysique, l'autre à l'étude des plasmas à l'échelle du laboratoire. Deux autres sessions concernèrent les Masers et Lasers, la première consacrée à la physique des Masers et Lasers, la seconde s'intéressant aux applications de ces dispositifs.

Ce volume est édité par Elsevier Publishing Company (Amsterdam, London, New-York). Des exemplaires gratuits ont été distribués aux Membres du Bureau, aux Présidents des Comités Nationaux ainsi qu'aux Membres de la Commission VII. Des exemplaires supplémentaires peuvent être commandés par les Comités Nationaux au Secrétariat Général de l'U.R.S.I.

XIVth GENERAL ASSEMBLY

Progress in Radio Science 1960-1963

Volume II. — Radio and Troposphere

Volume II of « Progress in Radio Science » is edited by F. Du Castel. After a report of the Chairman summarizing and classifying the contributions of the National Committees, the volume records the proceedings of Commission II on Radio and Troposphere during the XIVth General Assembly of U.R.S.I., Tokyo, September 1963. The subjects discussed include models of atmospheres and their comparison with theoretical and practical propagation data, problems of radioclimatology (climatic effects in tropospheric propagation and radiometeorological effects in propagation over sea and islands), the influence of topographic irregularities and vegetation on propagation, the influence of the troposphere on space communication, radiometeorology and cloud physics, problems of propagation of millimetre and submillimetre radio waves. Subsequent discussions and resolutions approved by the Commission II at the XIVth U.R.S.I. General Assembly are also recorded. The report of the joint session with Commissions III and IV devoted to the guidance of radio waves is published in volume IV of this series. Volume II is published by Elsevier Publishing Company (Amsterdam, London, New-York). Free copies have been distributed to the Officers of the Board, Presidents of National Committees and Officers of Commission II. Supplementary copies may be ordered by National Committees at the General Secretariat of U.R.S.I.

Volume VII. — Radioelectronics

Volume VII of « Progress in Radio Science » series is edited by R. E. Burgess. In this volume, the Chairman of Commission VII of U.R.S.I. reports on the activities of his Commission on radioelectronics during the triennium 1960-1963 and gives a summary

in an index form of the topics mentioned in the National Committee Reports received by him at the time of writing his paper and concluding remarks.

The book contains also the review papers, papers and abstracts of papers presented at Commissions VII meetings during the XIVth General Assembly of U.R.S.I., Tokyo, September 1963. Two sessions were devoted to plasma physics, one to plasma at the geophysical and astrophysical scale and one to plasmas at the laboratory scale. Two sessions dealt with Masers and Lasers, the first devoted to the physics of masers and lasers, the second to applications of these devices.

The Volume is published by Elsevier Publishing Company (Amsterdam, London, New-York). Free copies have been distributed to the Officers of the Board, Presidents of National Committees and Officers of Commission VII. Supplementary copies may be ordered by National Committees at the General Secretariat of U.R.S.I.

NATIONAL COMMITTEES

Czechoslovakia

MEMBERSHIP

President : Prof. Ing. Dr. Josef STRANSKY, Member-Correspondent of the Czechoslovak Academy of Sciences, Technical University of Prague, Faculty of Electrotechnical Engineering, Praha 6, Dejvice, Technicka 1902.

Secretary : Ing. Jiri POKORNY, C. Sc., Institute of Radio Engineering and Electronics, Czechoslovak Academy of Sciences, Praha 8, Lumumbova 1.

Commission I *on Radio Standards and Measurements* : Ing. Jiri TOLMAN, Institute of Radio Engineering and Electronics, Czechoslovak Academy of Sciences, Praha 8, Lumumbova 1.

Commission III *on the Ionosphere* : Ing. Ludmila TRISKOVA, C. Sc., Geophysical Institute, Czechoslovak Academy of Sciences, Praha 4, Bocni II.

Commission IV *on the Magnetosphere* : Ing. Frantisek JIRICEK, Geophysical Institute, Czechoslovak Academy of Sciences, Praha 4, Bocni II.

Commission V *on Radio Astronomy* : Ing. Antonin TLAMICHA, C. Sc., Astronomical Institute, Czechoslovak Academy of Sciences, Praha 2, Budecska 6.

Commission VI *on Radio Waves and Circuits* : Prof. Ing. Yan CHMURNY, C. Sc., Technical University of Slovakia, Bratislava, Vazovova 1-*b*.

Commission VII *on Radio Electronics* : Ing. Vaclav ZIMA, S. Sc., Director of the Institute of Radio Engineering and Electronics, Czechoslovak Academy of Sciences, Praha 8, Lumumbova 1.

United Kingdom

ELECTRONIC LETTERS

Readers might be interested in a monthly periodical which has recently joined the list of publications of the Institution of Electrical Engineers of Great Britain called *Electronics Letters.*

This international fast-communication journal contains letters of about 1000 words on original advances in electronic science, engineering, radio and automatic control. The contributions — which are accepted in German, French, Russian and Italian in addition to English — are published within 2-4 weeks of receipt.

Electronics Letters contains the most up-to-date information on theories, ideas and devices in electronics with the fastest publication dates and easy reading.

Further information regarding *Electronics Letters* can be obtained from the Secretary, I.E.E., Savoy Place,London E.C. 2.

U. S. A.

1965 FALL U.R.S.I. MEETING

HOPKINS CENTER, DARTMOUTH COLLEGE, HANOVER, N. H.

Jointly sponsored by the Commissions of the U. S. National Committee of U.R.S.I. and the following professional Groups of I.E.E.E. : Antennas and Propagation, Circuit Theory, Geoscience Electronics, Information Theory, Instrumentation and Measurements, and Microwave Theory and Techniques.

Preliminary Programme

MONDAY, OCTOBER 4. — COMBINED SESSION FOR ALL COMMISSIONS

COMMISSION 2. — *Radio propagation in non ionized media.*

Session 2.1. — Tuesday, October 5, A. M.

A. Effects of transmission media.

B. Surface scattering.

Session 2.2. — Tuesday, October 5, P. M.

Propagation measurements and theories.

COMMISSION 3. — *Ionospheric Radio.*

Session 3.1. — Monday, October 4, P. M.
The lowest ionosphere.

Session 3.2. — Tuesday, October 5, A. M.
The ionosphere at high latitudes.

Session 3.3. — Tuesday, October 5, P. M.
Sporadic-E and drifts.

Session 3.4. — Wednesday, October 6, A. M.
F-region observations and predictions.

Session 3.5. — Wednesday, October 6, P. M.
HF propagation.

COMMISSION 4. — *Magnetospheric radio.*

Session 4.1. — Monday, October 4, P. M.
Upper F-region and plasma resonance.

Session 4.2. — Tuesday, October 5, P. M.
VLF noise and magnetospheric phenomena.

COMMISSION 5. — *Radio and Radar Astronomy.*

Session 5.1. Monday, October 4, P. M.

COMMISSION 6. — *Radio waves and transmission of information.*

Session 6.1. — Monday, October 4, P. M.
Electromagnetic theory.

Session 6.2. — Tuesday, October 5, A. M.
Antennas.

Session 6.3. — Tuesday, October 5, P. M.
Antennas and data processing.

Session 6.4. — Wednesday, October 6, A. M.
Plasmas.

Session 6.5. — Wednesday, October 6, P. M.
Codes and signals in the noise.

COMMISSIONS AND COMMITTEES

Commission III on the Ionosphere

TOTAL SOLAR ECLIPSE NOVEMBER 1966

We are informed by Ing. V. H. Padula-Pintos, Chairman of the Argentine Commission III, that the Argentine National Committee for U.R.S.I. (CORCA) is planning to make some special observations from sites on the continent and also from a ship at sea, in November 1966, during the total solar eclipse observable from the Northern part of Argentina.

CORCA might help scientists from other parts of the world interested in such observations to solve problems regarding the temporary import of instruments, equipment, etc.

Ing. V. H. Padula-Pintos' address is : Ing. V. H. Padula Pintos, Executive Secretary, CORCA, av. Libertador, 327, Vicente Lopez (Bs. As.), Argentina.

IONOSPHERIC DATA

We have the pleasure to inform our readers that the *Institute « Mihailo Pupin » for Automation and Telecommunications*, Beograd, Yugoslavia, is publishing a monthly bulletin of ionospheric data of observations carried out at Beograd (Lat. 44°48′ N, Long. 20°31′ E).

Data are given on :

F-region, hourly values of *f*min, foF2, M(3000)F2, *h*′F2, *h*′F, foF1, M(3000)F1.

E-Region, hourly values of foE, *h*′E, flEs, foEs, *h*′Es.

Types Es.

BIBLIOGRAPHIE

Le Groupe de Recherches Ionosphériques du Centre d'Etude des Télécommunications (France) a publié : « Observation d'irrégularités d'ionisation dans l'ionosphère inférieure et supérieure » par F. du Castel, J. M. Faynot et G. Vasseur.

Cette communication a été présentée au N.A.T.O. Advanced Study Institute on Electron Density Profiles in the Ionosphere and Exosphere (Fins, Norvège, avril 1965).

I.Q.S.Y.

Report of the Working Group on Ionosphere (see *Information Bulletin*, No. 151, p. 34).
Organization of International Co-operation in Solar-Terrestrial Physics after I.Q.S.Y. (see p. 54).
Ionospheric Physics (see p. 55).
The Arecibo Radar Installation (see p. 56).
Data interchange and W.D.Ss (see p. 58).

INDICES D'ACTIVITÉ SOLAIRE POUR LA PROPAGATION IONOSPHÉRIQUE

(Extrait du *Journal des Télécommunications*, Vol. 32, n° 8, août 1965)

Les tableaux ci-après, contenant les valeurs des indices fondamentaux de la propagation ionosphérique, ont été établis par le secrétariat spécialisé du Comité consultatif international des radiocommunications (C.C.I.R.), conformément à la Résolution 4, l'Avis 371 et le Rapport 246 du C.C.I.R.

Remarque : De nombreux détails sur les indices ionosphériques sont contenus dans une publication récente : *Advances in radio research*, volume 2, éditée par J. A. Saxton (Academic Press, Londres et New York, 1964). Il s'agit de la contribution de C. M. Minnis, intitulée *Ionospheric indices*, pages 1-36, de l'ouvrage en question.

Valeurs Observées :

● R_{12} (moyenne glissante sur douze mois du nombre de taches solaires) :

Année \ Mois	1	2	3	4	5	6	7	8	9	10	11	12
1963	29	30	30	29	29	28	28	27	27	26	23	21
1964	19	18	15	13	11	10	10	10	10	10	10	11
1965	12											

● I_{F_2} (indice ionosphérique) :

Mois (année 1964)

1	2	3	4	5	6	7	8	9	10	11	12
0(2)*	6(2)*	20(2)*	14(2)*	1(2)*	—3(1)*	1(1)*	—3(1)*	4(1)*	3(1)*	—3(1)*	—4(1)*

Mois (année 1965)

1	2	3	4	5	6	7
7(1)*	5(1)*	20(1)*	18(1)*	10(1)*	15(1)*	17(1)*

(*) Les chiffres entre parenthèses indiquent le nombre de valeurs de foF_2 qui ne sont pas encore parvenues au secrétariat du C.C.I.R. et dont on n'a donc pas tenu compte dans le calcul de l'indice I_{F_2}. Pour plus de détails, voir *Journal des télécommunications* (avril 1964, page 119).

Par rapport aux données contenues dans le Rapport 246 du C.C.I.R., une station de sondages ionosphériques a cessé de fonctionner — celle de Porto Rico (en juin 1963). Les valeurs de I_{F_2} contenant entre parenthèses le chiffre (1) sont donc depuis le mois de juin 1963 les valeurs définitives de l'indice I_{F_2}. En outre, la station de Fairbanks (College) n'a pas fonctionné pendant la période août-octobre 1963. Pour une période les valeurs définitives de l'indice I_{F_2} sont celles contenant le chiffre (2) entre parenthèses.

● ⌀ (flux du bruit solaire moyen mensuel) ** :

Année \ Mois	1	2	3	4	5	6	7	8	9	10	11	12
1964	74	76	75	73	69	69	67	69	70	73	73	78
1965	78	75	74	72	78	77						

(**) Renseignements obligeamment fournis par le « National Research Council », Ottawa.

PRÉVISIONS POUR LES MOIS A VENIR (1er août 1965) *** :

● R_{12}

Année \ Mois	8	9	10	11	12
1965	21	23	25	27	30

(***) Renseignements obligeamment fournis par le professeur Waldmeier, Observatoire fédéral de Zurich.

Estimation de l'erreur sur les prévisions de R_{12} : ± 10.

● I_{F_2} ****

Année \ Mois	7	8	9	10	11	12	(1) 1966
1965	16	19	22	25	28	31	(35)

(****) Renseignements obligeamment fournis par le « Department of Scientific and Industrial Research, Radio and Space Research Station », Slough.

La valeur prévue six mois à l'avance est donnée entre parenthèses.

Estimation de l'erreur sur les prévisions de I_{F_2} :

Mois (1965)	6	7	8
maximum	+3	+2	+2
minimum	—8,5	—11	—13

Mois (1965)	9	10	11	12
maximum	+ 1,5	+ 1	+ 0	+ 0
minimum	—14,5	—16	—16,5	—16,5

SOLAR INDICES FOR IONOSPHERIC PROPAGATION

(Reprint from *Telecommunication Journal*, Vol. 32, No. 8, August 1965)

The following Tables, giving values of the basic indices for ionospheric propagation have been prepared by the Specialized Secretariat of the International Radio Consultative Committee (C.C.I.R.) in accordance with C.C.I.R. Resolution 4, Recommendation 371, and Report 246.

Note : A considerable amount of information on ionospheric indices will be found in an article by C. M. Minnis, entitled *Ionospheric indices* on pages 1-36 of the recent publication *Advances in radio research*, volume 2, edited by J. A. Saxton (Academic Press, London and New-York, 1964).

PARAMETERS :

● R_{12} (smoothed mean, over twelve months, of the number of sunspots observed) :

Year \ Month	1	2	3	4	5	6	7	8	9	10	11	12
1963	29	30	30	29	29	28	28	27	27	26	23	21
1964	19	18	15	13	11	10	10	10	10	10	10	11
1965	12											

● I_{F_2} (ionospheric index) :

Month (year 1964)

1	2	3	4	5	6	7	8	9	10	11	12
0(2)*	6(2)*	20(2)*	14(2)*	1(2)*	—3(1)*	1(1)*	—3(1)*	4(1)*	3(1)*	—3(1)*	—4(1)*

Month (year 1965)

1	2	3	4	5	6	7
7(1)*	5(1)*	20(1)*	18(1)*	10(1)*	15(1)*	17(1)*

(*) The figures in brackets represent the number of values of foF_2 which have not yet reached the C.C.I.R. Secretariat, and which have not therefore been taken into account in the calculation of I_{F_2}. For further details, see the *Telecommunication Journal*, April 1964, page 119.

With regard to the data contained in C.C.I.R. Report 246, one ionospheric sounding station has ceased to operate — Puerto Rico (in June 1963). The values of I_{F_2} that include the figure (1) in brackets are therefore, as from the month of June 1963, definitive values for I_{F_2}. Furthermore the sounding station Fairbanks (College) did not operate during the period August-October 1963. For this period the definitive values of I_{F_2} are those including the figure (2) in brackets.

● ⌀ (monthly mean value of solar noise flux) ** :

Year \ Month	1	2	3	4	5	6	7	8	9	10	11	12
1964	74	76	75	73	69	69	67	69	70	73	73	78
1965	78	75	74	72	78	77						

(**) Data kindly supplied by the National Research Council, Ottawa.

FORECASTS FOR THE NEXT FEW MONTHS (1 August 1965) *** :

● R_{12}

Year \ Month	8	9	10	11	12
1965	21	23	25	27	30

(***) Data kindly supplied by Professor Waldmeier, Federal Observatory, Zurich.

Estimated error in forecasts of R_{12} : ± 10.

● I_{F_2} ****

Year \ Month	7	8	9	10	11	12	(1) 1966
1965	16	19	22	25	28	31	=

(****) Data kindly supplied by the Department of Scientific and Industrial Research, Radio and Space Research Station, Slough.
The figure in brackets is the value forecast six months in advance.

Estimate of the error in I_{F_2} predictions :

Month (1965)	6	7	8
maximum	+3	+2	+2
minimum	—8,5	—11	—13

Month (1965)	9	10	11	12
maximum	+ 1,5	+ 1	+ 0	+ 0
minimum	—14,5	—16	—16,5	—16,5

Commission IV on the Magnetosphere

I.Q.S.Y.

Organization of International Co-operation in Solar-Terrestrial. Physics after the I.Q.S.Y. (see p. 54).

Commission V on Radio Astronomy

I.Q.S.Y.

Report of Working Group for Solar Activity (see p. 52).
Data Interchange and W.D.Cs (see p. 58).

Commission VI on Radiowaves and Circuits

COLLOQUIUM ON MICROWAVE COMMUNICATION

The Department of Technical Science of the Hungarian Academy of Science and the Scientific Society of Telecommunications organize from Tuesday, April 19 to Friday, April 22 1966 a « Colloquium on Microwave Communication » to be held in Budapest, Hungary.

The Colloquium will be the third one in the series which include the « Colloquium on Microwave Communication », Budapest in 1959 and the « Second Colloquium on Microwave Communication », Budapest in 1962.

Papers concerning microwave communication will be welcomed in the following fields :
Communication System Theory.
Circuit Theory and Techniques.
Microwave Theory and Techniques.
Microwave Electronics.
System Measurements and Techniques.

Papers should be sent to *Valko Pelerne*, Secretary of the organizing committee — Technika Haza, Budapest V, Szabadsag ter 17, *Hungary*.

Admitted languages are English, Russian and Hungarian.

A simultaneous translation will take place in the languages mentioned above.

Authors are requested to submit summaries, containing between 200 and 300 words in the English or the Russian Language.

The summaries must have reached the secretary of the organizing committee before October 15, 1965. Authors will be informed as soon as possible, whether their paper has been accepted.

Deadline of sending in the approved manuscript : 15 January 1966.

Registration before 15 January 1966.

For further information please communicate with the Secretary : *Valko Peterne, Budapest V, Szabadsag ter 17, Hungary.*

TOWERS AND MASTS

The Technical Centre of the European Broadcasting Union, Brussels, has issued a technical monograph.

Towers and masts for VHF and UHF transmitting aerials

by F. D. Bolt (B.B.C.)

in collaboration with A. M. Beresford-Cook (I.T.A.), R. Busi (R.A.I.), A. Delobel (O.R.T.F.), H. Kreutztraeger (N.D.R.).

The various topics dealt with in the book are :

Factors influencing the choice of support and type of construction.
Climatic factors influencing the structural design.
General constructionel characteristics.
The choice of aerial height.
The interdependence of aerial and support designs.
The simultaneous utilisation of aerial masts and towers for other purposes.
Maintenance problems.

The book contains three appendices :

I. Basis of calculation for metal masts and towers.
II. Relative costs of the different types of construction.
III. Examples of existing towers and masts.

Commission VII on Radio Electronics

1965 INTERNATIONAL ELECTRON DEVICES MEETING

WASHINGTON, D. C., OCTOBER 20-22, 1966

New microwave generators which have attracted widespread attention in the industry will be discussed by four leaders in the field at the opening session of the 1965 International Electron Devices Meeting (I.E.D.M.) next fall.

The I.E.E.E. conference, which takes on a broader look in programme and goes international for the first time this year, will be held at the Sheraton Park Hotel in Washington, D. C., October 20-22.

Dr. James B. Gunn of the I.B.M. Research Center, Yorktown Heights, N. Y. will chair the general keynote session on « Two-Terminal Semiconductor Devices » Wednesday, October 20. He will introduce the discussion and then present : Dr. A. L. McWhorter, MIT-Lincoln Laboratory, Lexington, Mass. ; Dr. Bernard C. De Loach, Bell Telephone Laboratories, Murray Hill, N. J., and Dr. C. Hilsum, Ministry of Aviation, Royal Radar Establishment ; Great Malvern, Worsc., England.

The discussion will cover the Gunn Effect, discovered in 1964 when Dr. Gunn made the first observation of microwave oscillation in bulk gallium arsenide, and the Read oscillator, predicted by Dr. W. T. Read of Bell Laboratories. Other devices involving transit-time, avalanche multiplication, or « bulk » effects will also be described.

Another feature of the devices meeting this year will be a session or sessions on second breakdown phenomena, particularly important in power applications. That part of the programme is being organized by Professor A. C. English of the University of California at Berkeley.

The conference will cover research, development ; design and manufacture of electron devices in five major areas — energy conversion, electron tubes, integrated circuits, solid state devices, and quantum electronic devices.

Dr. Clare G. Thronton of Philco Corporation's Lansdale (Pa.) Division is serving as general chairman of the 11th annual meeting.

Further information on the meeting available from the :
Institutute of Electrical and Electronics Engineers, Inc., 345, East 47th Street, New-York, N. Y. 10017.
or from
Clyde C. Ball, Chairman, Publicity Committee 1965, Electron Devices Meeting, Philco Corporation, Tioga and C. Streets, Philadelphia, Pa., 19134.

U.R.S.I. Committee for International Cooperation in Geophysics

I.Q.S.Y.

Present and future arrangements for International Co-operation in the I.Q.S.Y. disciplines.

During the last Assembly of I.Q.S.Y. a discussion meeting was held on present and future arrangements for international co-operation in the I.Q.S.Y. disciplines.

Prof. W. J. G. Beynon, President of I.Q.S.Y. opened the meeting by delivering the adress reproduced below from *I.Q.S.Y. Noles*, No. 13, June 1965 :

« At a meeting of the I.Q.S.Y. Bureau in London in 1964, there was considerable discussion about possible arrangements for continued international collaboration in geophysics after the end of the I.Q.S.Y. In particular, we had some discussion on questions such as the possible need for a limited programme of intensive observations during the next solar maximum, the long-term level of the international exchange of data and the long-term operation of the W.D.Cs. It was agreed that this IIIrd I.Q.S.Y. Assembly in Madrid would provide a valuable opportunity for the further consideration of matters of this sort. Hence, at the outset of the Assembly, we have called this open meeting to discuss present and future arrangements for international cooperation in the I.Q.S.Y. disciplines.

» As many of you already know, the I.Q.S.Y. Committee will formally cease to exist on 31st July 1967, but your Committee

feels that it has a duty to examine these problems and perhaps to make proposals to I.C.S.U. for dealing with them. In the past 10 or 15 years, a period which includes the I.G.Y. and the I.Q.S.Y., we have accumulated a great deal of experience relating to the question of world-wide cooperation in geophysics, and it is right and proper that we should try to bring this experience to bear on what ought to be done on a long-term basis. By way of introduction to this discussion, perhaps I may quickly remind you about one or two points relating to recent international cooperation in geophysics.

» The I.G.Y. was the third and by far the largest cooperative effort of its kind. The earlier enterprises, the First Polar Year of 1882 and the Second Polar Year of 1932, were clearly defined and self-contained exercises which involved comparatively few nations. No special consideration was given, and no special arrangements were made for extensive continued cooperation in geophysics after the end of these two enterprises. It is true, of course, that networks of stations continued to make observations before and after the Second Polar Year, put any necessary coordination of the work of the stations was effected by the appropriate Scientific Unions. Thus, within I.U.G.G., the International Association of Terrestrial Magnetism and Electricity maintained a degree of coordination in geomagnetic measurements. In the ionospheric field, collaboration and data interchange between ionospheric stations and their parent organizations was maintained partly through U.R.S.I. and partly by direct interchange of data and information between the stations themselves. This situation persisted until the I.G.Y. period.

« However, the I.G.Y. completely changed the international situation in geophysics. After its establishment by I.C.S.U. in 1962, the Special Committee for the I.G.Y. (C.S.A.G.I.) brought together workers in many fields and, as we know, the I.G.Y. itself was a vast enterprise which greatly exceeded anything previously known. At the conclusion of the I.G.Y., we suddenly found ourselves confronted with the problem of deciding what to do about long-term arrangements for geophysical observations of all kinds and for general cooperation in this field of research. Some of us felt that, after the intensive I.G.Y. observational programmes, we should return to « normal » pre-I.G.Y. conditions ; others felt that we should continue at a fairly high level of activity

for many years to come. The so-called I.G.C.-1959 can be regarded as a compromise between these two viewpoints.

« At the I.C.S.U. General Assembly in Washington in 1958, it was decided to replace C.S.A.G.I. by a special committee for Inter-Union cooperation in Geophysics (S.C.G.). At the same time, the Assembly established three new special committees which had effectively grown out of the I.G.Y. These are now the Scientific Committees on Oceanic Research (S.C.O.R.), on Antarctic Research (S.C.A.R.), and on Space Research (C.O.S.P.A.R.) ; in addition, there was established the International Ursigram and World Days Service (I.U.W.D.S.), an organization which was intended to function under U.R.S.I. Thus in 1958, at the end of the I.G.Y., we had at least five new continuing organizations resulting from that enterprise. In establishing S.C.G., I.C.S.U. recommended that its membership be drawn mainly from the membership of C.S.A.G.I. Within a year or so, S.C.G. was itself replaced by the International Committee for Geophysics (C.I.G.) which was, and is, an Inter-Union Committee involving I.U.G.G., I.A.U., U.R.S.I. and I.U.P.A.P. An elaborate set of rules for C.I.G. was drafted by I.C.S.U. and the specified objects of the Committee were, first : « to ensure the fullest possible exploitation of the I.G.Y. and I.G.C. 1959 data, including :

(*a*) maintaining the efficient functioning of the W.D.Cs ;

(*b*) encouraging the discussion and utilisation of I.G.Y. and I.G.C.-1959 results, and publishing the I.G.Y. and I.G.C.-1959 results and bibliographies. »

« The second objective of C.I.G. was « to develop and coordinate international plans for the furtherance of cooperation in geophysics and related sciences, especially those of an inter-disciplinary nature, including the assembly and intercomparison of national programmes, the development of international data interchange arrangements and the continued utilization of W.D.Cs, and to encourage appropriate discussion and publication of the results of such programmes ».

» For various reasons, which we need not consider here, much of the work of C.I.G. has lately been divided between three other Committees : the World Magnetic Survey Board, the Upper Mantle Committee, and the I.Q.S.Y. Committee ; at present C.I.G. is left only with the completion of I.G.Y. matters and with the overall supervision of the W.D.Cs and data flow.

» In addition to giving rise to a number of new special committees, the I.G.Y. also left, on the geophysical scene, a complex of some 20 or 30 World Data Centres. It is interesting to note that it was at the Fourth Meeting of C.S.A.G.I. in Barcelona in 1956 that the formal plans were first drafted for « World Data Centres ». I recall being myself a member of a small Committee, together with Drs. Beloussov, Berkner, Laclavère and van Mieghem ; this Committee had been appointed by C.S.A.G.I. to draft proposals on the constitution and location of Data Centres, to report on operational costs, storage facilities, the flow of data itself and the need for monitoring such flow. We were asked also to consider the relation between existing international scientific permanent services and the Centres themselves. A as result of our recommendations, C.S.A.G.I. authorised the establishment of a number of World Data Centres and specified that each Centre should be international in the sense that it would be at the service of all countries and scientific bodies. It was also stated that the arrangements that were already in existence at that time for the interchange of geophysical observations should not be disturbed.

» Our purpose in calling this discussion this afternoon is to invite opinions on the whole problem of present and future arrangements for international cooperation in the I.Q.S.Y. disciplines. Of course, 11 of the disciplines are also the concern, to a greater or lesser extent, of one or other of the Scientific Unions or, as in the case of Space Research, the discipline is the special concern of a Scientific Committee of I.C.S.U.

» In discussing the question of data flow, we must remember that within the I.C.S.U. framework there already exists a Federation of Astronomical and Geophysical Permanent Services (F.A.G.S.). Certain Permanent Services, which provide fundamental astronomical and geophysical observational data, have been in existence for more than 50 years, but the idea of forming a Federation of Permanent Services was, I believe, first put forward early in 1954 by Monsieur Laclavère, who was then Secretary General of I.U.G.G. After numerous discussions F.A.G.S., as we now know it, was finally accepted within the framework of I.C.S.U. in 1956. Let me make it clear that I am not, at the moment, suggesting that the W.D.Cs should be attached to F.A.G.S. but, in a discussion of this sort, I certainly think we should take cognizance of the existence of F.A.G.S. and consider whether

some parallel arrangement could be drafted for the W.D.Cs, or whether W.D.Cs could in some way be associated with the F.A.G.S. organization.

» In these remarks, I have made some reference to C.I.G. As at present constituted, C.I.G. has within itself the I.Q.S.Y. disciplines, but it also has other non-I.Q.S.Y. disciplines such as oceanography, glaciology and seismology. Our purpose this afternoon is not to discuss the future of C.I.G., but whatever plans are eventually made for the I.Q.S.Y. disciplines must clearly have repercussions concerning the future of C.I.G.

» When we established the I.Q.S.Y. Committee, we were quite clear that we were dealing with a well-defined two-year project. We felt that it would be more satisfactory to have a Committee with a limited life and with a definite mission to be accomplished ; we also felt that, when this mission had been completed, it would be proper to dissolve the Committee. Meanwhile I.C.S.U. is seeking the advice of the I.Q.S.Y. Committee on two specific problems : the long-term « normal » flow of data to the World Data Centres and the long-term operation of these Data Centres. It will be of material assistance to the I.Q.S.Y. Committee if we can have a free discussion about these questions this afternoon. We have also asked the Chairmen of each discipline Working Group to place this matter on his agenda and we hope that this initial discussion will help the Working Goups in their later deliberations.

» I would not suggest that we attempt to draft any formal resolutions at this open meeting, but I can assure you that the Committee in its own deliberations, and in its discussions with I.C.S.U., will take appropriate account of the views expressed at this Assembly. »

I.U.W.D.S.

Synoptic Codes for Solar and Geophysical Data (1963)

NEW STATION INDICATORS

Indicator	Observatory	Country	Codes
02	Catania	Sicily	UFLAR
25	U. S. Naval Research at Washington	U. S. A.	USOXA
39	Ivalo	Finland	UCOSC
41	Tucson	U. S. A.	UMAGA
43	Reykjavik	Iceland	UCOSC

REGIONAL WARNING CENTERS

ADRESS CHANGES:

Western Europe

Paris Section

Mail : Service des Ursigrammes et Jours Mondiaux,
Observatoire de Paris,
Meudon (Seine et Oise), France.
Telephone : 027-1139.
Immediate Charge : Dr. P. SIMON.

Darmstadt Section

Telephone : Darmstadt 83-2530 (BECKMANN)
-2549 (OCHS)
-2533 (RICHTER).

Western Pacific

Tokyo, Japan.

Telex : 20-219-12 (DEMPA TAC) (Incorrect in Circular Letter RWC-86).
Telephone : Japan 042321-1211.

ASSOCIATE REGIONAL WARNING CENTERS

Australia

Mail : Ionospheric Prediction Service
The Commonwealth Centre,
Chifley Square,
Sydney, N. S. W., Australia.
Telephone : 20340 ext. 3366 (2230-0700 U. T.)
After hours : 408848.

Alaska : The associate center at Anchorage has been deleted in view of change in the role of the station to that of a specialized high-latitude space environment monitoring station. The service to the region formerly covered by Anchorage is now handled by AGIWARN.

I.U.W.D.S. International Geophysical Calendar for 1966

A supply of the Calendars has been mailed to each R.W.C. and A.R.W.C. during the first week of September 1965.

Copies are available by request to : Miss J. Virginia Lincoln, I.U.W.D.S. Deputy Secretary, National Bureau of Standards, Boulder Laboratories, Boulder, Colorado, 80301, U. S. A.

Explanations

1. PURPOSE. — The International Geophysical Calendar designates days and intervals selected for special attention for geophysical observations, experiments, data interchange or analyses. It is thus a framework for worldwide and interdisciplinary coordination in those programs where it is not practical or meaningful to carry out the same work for each and every day. The Calendar serves mainly the branches of geophysics dealing with the earth's atmosphere. A principal use is for the coordination of the sampling of the many phenomena which vary significantly during the course of a year. The Calendar is prepared by the International Ursigram and World Days Service (I.U.W.D.S.) with the advice of the

1966 **JANUARY**

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

1966 **FEBRUARY**

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					

1966 **MARCH**

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		

1966 **APRIL**

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

1966 **MAY**

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				

1966 **JUNE**

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		

1966 **JULY**

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						

1966 **AUGUST**

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			

1966 **SEPTEMBER**

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	

1966 **OCTOBER**

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					

1966 **NOVEMBER**

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			

1966 **DECEMBER**

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

1967 **JANUARY**

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

(11) Regular World Day (RWD)

20 Day of Solar Eclipse

3 Day with unusual meteor shower activity

7 8 World Geophysical Interval (WGI)

16 Quarterly World Day (QWD) also a PRWD and RGD

(12) Priority Regular World Day (PRWD)

5 Regular Geophysical Day (RGD)

TABLE OF WORLD DAYS MARKED ON THE CALENDAR

1966	RWD	PRWD	QWD	RGD	WGI	ECL.	METEORS
Jan.	11, 12, 13	12	—	5, 12, 19, 26	—	—	3-4
Feb.	15, 16, 17	16	16	2, 9, 16, 23	7-20	—	—
Mar.	15, 16, 17	16	—	2, 9, 16, 23, 30	—	—	—
Apr.	12, 13, 14	13	—	6, 13, 20, 27	—	—	22
May	17, 18, 19	18	18	4, 11, 18, 25	9-22	20	4-6
June	14, 15, 16	15	—	1, 8, 15, 22, 29	—	—	6-10
July	12, 13, 14	13	—	6, 13, 20, 27	—	—	28-30
Aug.	16, 17, 18	17	17	3, 10, 17, 24, 31	8-21	—	10-14
Sep.	13, 14, 15	14	—	7, 14, 21, 28	—	—	—
Oct.	11, 12, 13	12	—	5, 12, 19, 26	—	—	20-21
Nov.	15, 16, 17	16	16	2, 9, 16, 23, 30	7-20	12	16-17
Dec.	13, 14, 15	14	—	7, 14, 21, 28	—	—	12-14
							22-23

I.Q.S.Y. Reporters or spokesmen for the various scientific disciplines, especially for the suggested scientific programs recommended to be carried out for the days or intervals marked on the Calendar (see paragraphs 11 to 16 below). In addition it is common practice for individual geophysical stations or groups of stations to arrange some of their plans of observations according to the Calendar. Thus geophysicists can expect that their colleagues in other countries, in other laboratories and in other geophysical disciplines will tend to be making increased efforts for the days and intervals marked on the Calendar; the amount of geophysical data in existence, at the World Data Centers and elsewhere, will accordingly be greater for Calendar days.

2. Universal Time (U. T.) is the standard of time for all world days on the Calendar, i. e., each begins at 0000 U. T. and ends at 2400 U. T.

3. Regular Geophysical Days (R.G.D.) are each Wednesday throughout the year. This weekly sampling schedule is particularly designed for the purposes of the meteorological program but has also been adopted for some other geophysical programs.

4. Regular World Days (R.W.D.) are three consecutive days each month, always Tuesday. Wednesday, Thursday near the middle of the month. They are intended for observations, experiments or analyses which can or need be made for about 10 % of days and which should be spaced (in groups of three days) throughout the year.

5. Priority Regular World Days (P.R.W.D.) are one day each month — the R.W.D. which are also a R.G.D. (Wednesday). They are for work which can or needs to be done only one day each month throughout the year.

6. Quarterly World Days (Q.W.D.) are one day in each quarter of the year. They are the P.R.W.D. which fall within the World Geophysical Intervals (W.G.I.) and are also a R.G.D. (Wednesday). The Q.W.D. serve to coordinate seasonal high-altitude rocket experiments.

7. World Geophysical Intervals (W.G.I.) during 1966 are fourteen consecutive days in each season, beginning on the second Monday of the selected months. They always include the three R.W.D. of the month and the Q.W.D. for the season. The W.G.I. are intended for intensified programs aimed at the statistics of seasonal variations or the timing of seasonal changes. The sche-

dule of W.G.I. relative to the equinoxes and solstices is deliberately made different from year to year so that in due course a W.G.I. will cover the time of seasonal change of each of various geophysical phenomena ; variations from this principle will sometimes be made in order to include a solar eclipse within a W.G.I.

8. Solar Eclipses are May 20 (annular) with central line extending from North Africa to Central Asia, and November 12 (total) with central line extending from the equator west of South America, to a point south of South Africa. Geophysical stations in the eclipse zones treat these days as world days and undertake special programs to study eclipse effects on the earth's atmosphere. For maps of the eclipse zones and pertinent details see any standard astronomical ephemeris or yearbook.

9. Meteor Showers of special interest are also marked on the Calendar, including some of the important visual showers and also unusual showers observable mainly by radio and radar techniques. Attention is called to these days (selected by P. Millman, Ottawa) in case ionization produced by meteors may account for unusual effects in other geophysical experiments. In 1966 the *Leonid* meteor shower, Nov. 16-17, *may* be stronger than in the last 25 years. Although the Leonids gave spectacular displays in 1833 and 1866-67, planetary perturbations prevented a repeat of these displays in 1900 and 1933.

10. « World Days » not appearing on Calendar. — The occurrence of unusual solar or geophysical conditions are announced or forecast through various types of geophysical « *Alerts* » which are widely distributed by telegram and radio broadcast on a current schedule. The types of Alerts are : magnetic storm (in telegrams MAGSTORM), magnetic calm (MAGCALME), solar flare (SOLFLARE), solar activity (SOLACTIVITY), cosmic ray event (COSMIC EVENT), and sudden and unusual stratospheric warmings (STRATWARM). These Alerts are issued by the I.U.W.D.S. World Warning Agency or under certain circumstances by one of the solar-geophysical Regional Warning Centers. The meteorological telecommunications network coordinated by W.M.O. carries the worldwide Alerts once daily soon after 0400 U. T. Many geophysical stations in the various disciplines increase their programs or carry on special experiments to take advantage of the special solar or geophysical conditions during the period of Alert. Selections of *Retrospective World*

Intervals, after a delay of a few months, are also announced by the World Warning Agency. An additional service of the Regional Warning Centers is to notify geophysical and solar stations promptly (*Ursigrams*) with summary details of immediately significant geophysical observations and of major solar events which have important and sometimes long-lasting geophysical effects. The telegraphic addresses of the Regional Warning Centers are as follows : AGIWARN WASHINGTON (U. S. A.) ; DEMPA TOKYO (JAPAN) ; NIZMIR MOSCOW (U. S. S. R.) ; IONOSPHAERE DARMSTADT (G.F.R.) or CNETAGI BAGNEUX (FRANCE) or AGI NEDERHORSTDENBERG (NETHERLANDS). Associate R.W.C. operate in some other localities.

Recommended Scientific Programs Operational Edition

(The following material was reviewed in 1965 by scientific working groups of the III Asembly of the I.Q.S.Y. Committee and the 8th Meeting of C.O.S.P.A.R. as suitable for coordinated geophysical programs in 1966.)

11. Meteorology. — Particular efforts should be made to carry out an intensified programme on the R.G.D. — each Wednesday, U.T. A desirable goal would be the scheduling of meteorological rocket-sondes, ozone sondes and radiometer sondes on these days, together with maximum — altitude rawinsonde ascents at both 0000 and 1200 U. T.

During W.G.I. and STRATWARM alert intervals, intensified programmes are also desirable, preferably by the implementation of R.G.D.-type programmes (see above) on Mondays and Fridays, as well as on Wednesdays.

12. Geomagnetism. — It has always been a leading principle for geomagnetic observatories that operations should be as continuous as possible. Thus the great majority of stations taking part in the geomagnetic program will undertake the same program without regard to the Calendar. The days marked on the Calendar will be of interest mainly to the following two types of geomagnetic stations : (*a*) Stations recording quick-run micropulsations (with fast chart speeds) are requested to make such records on every R.G.D. — each Wednesday, U. T. — according to the following schedule : 1966 Jan. 5 from 1400 to 1800 U.T. ; Jan. 12 from 1500 to 1900 U.T. ;

Jan. 19 from 1600 to 2000 U.T. ; etc. The observatories are not obliged to send their recordings to the World Data Centers except by special request (see I.Q.S.Y. World Days Manual under Retrospective World Intervals on Micropulsations). (*b*) Stations which, in addition to other activities, are equipped for making magnetic observations, but which cannot carry out such observations and reductions on a continuous schedule are encouraged to carry out such work at least on R.W.D. (and during times of MAGSTORM Alert).

13. Ionosphere. — For the vertical incidence sounding program, the summary recommendations are : (*a*) soundings to be made at five minute intervals or less on R.W.Ds for stations normally making observations every quarter hour or at more frequent intervals ; all stations are recommended to make at least quarter hourly observations on R.W.Ds ; (*b*) *f*-plots are made for high latitude stations and representative stations at lower latitudes for all days (i.e., including R.W.Ds and W.G.Is) ; (*c*) profile parameters *hc*, *qc* or recommended similar parameters to be determined and sent to W.D.Cs for R.W.Ds for all stations except those undertaking full profile programs or producing monthly median profiles ; (*d*) copies of hourly ionograms with appropriate scales for P.R.W.Ds are to be sent to W.D.Cs ; (*e*) stations in the eclipse zone should take continuous observations on solar eclipse days and special observations on adjacent days in accordance with detailed recommendations in Ionosphere Manuals. Continuous records of ionospheric parameters are acceptable in place of *f*-plots at temperate and low latitude stations.

For the ionospheric drifts program, observations are made at least on all R.W.Ds, on all W.G.Is, on every Wednesday (R.G.Ds) and on every Thursday (day following each R.G.D.). Hourly tabulations for all days mentioned are sent to the W.D.Cs. It is essential that sufficient observations be made to provide representative values of the diurnal variations. Hourly tabulations for this purpose should also be sent to W.D.Cs.

For the ionospheric absorption program, diurnal hourly observations are made at least on all R.W.Ds and hourly tabulations sent to W.D.C.s. Continuous observations on *solar eclipse* days, where possible, for stations in eclipse zone. Special efforts should be made to obtain additional absorption measurements at temperate latitude stations during the period of Absorption Winter

Anomaly, particularly on days of abnormally high or abnormally low absorption (approximately November-March, Northern Hemisphere ; May-September, Southern Hemisphere).

For back-scatter and forward-scatter programs, observations should be made on all R.W.Ds at least.

For topside sounding experiments, it is recommended to send copies of records to W.D.Cs for all R.W.Ds at least.

It is recommended that more intensive observations in all programmes be considered on days of unusual meteor activity. (See paragraph 9 above on the Leonid shower, Nov. 16-17.)

14. Solar Activity. — Observatories are invited to issue and send to the W.D.Cs of all disciplines special reports of their regular and any special observations on all *solar eclipse* days to assist in the interpretation of geophysical observations made in the eclipse zones. The total eclipse of November 12, 1966, although of relatively short duration, is of some special interest for astronomers and geophysicists since the path lies in low geomagnetic latitudes and near several long-established geophysical observatories.

15. Cosmic Rays, Aeronomy. — Experimenters should take into account that observational effort in other disciplines tends to be intensified on the days marked on the Calendar, and schedule balloon and rocket experiments accordingly if there are no other geophysical reasons for choice.

16. Space Research. — In view of the variability of the D and E regions of the ionosphere, it is desirable to make rocket measurements of their characteristics on the same day at as many locations as possible. Where feasible, experimenters should endeavor to launch rocket on the *Quarterly World Days* (*Q.W.D.*) since these are also days when there will be maximum support from ground observations.

The International Ursigram and World Days Service (I.U.W.D.S.) is a permanent scientific service of the International Union of Radio Science (U.R.S.I.), with the participation of the International Astronomical Union and the International Union of Geodesy and Geophysics. I.U.W.D.S. adheres to the Federation of Astronomical and Geophysical Services of the International Council of Scientific Unions. The I.U.W.D.S. coordinates the international aspects of the world days program and rapid data interchange, and also publishes subsequently an annual *Calendar Record* of solar and geophysical indices and events.

This Calendar for 1966 has been drawn up by A. H. Shapley, Chairman, and J. V. Lincoln, Deputy Secretary, of the I.U.W.D.S. Steering Committee, in close association with the C.I.G. Committee and the Reporters and spokesmen for the various I.Q.S.Y. scientific disciplines and C.O.S.P.A.R. Similar Calendars have been issued annually beginning with the I.G.Y., 1957-1958, and have been published in various widely available scientific publications.

Additional copies are available upon request to I.U.W.D.S., c/o Secretary General of U.R.S.I., 7, Place Danco, Brussels 18, Belgium ; or I.U.W.D.S., Deputy Secretary, Miss J. V. Lincoln, C.R.P.L., National Bureau of Standards, Boulder, Colorado, 80301, U. S. A.

I.Q.S.Y.

Report of the Working Group on World Days (see p. 56)

* * *

Post-I.Q.S.Y. World Days Programme

Mr. A. H. Shapley, Chairman of the I.U.W.D.S. Steering Committee, outlined during the last Assembly of I.Q.S.Y. the contents of the document reproduced in *I.Q.S.Y. Notes*, n° 13, June 1965:

The coordination of geophysical work by such means as the International Geophysical Calendar and circulation of the telegraphic world-wide and regional alerts has been carried on since the I.G.Y., under I.C.S.U. auspices, by the I.U.W.D.S. (International Ursigram and World Days Service). This is a Permanent Service of the International Scientific Radio Union (U.R.S.I.) in association with the International Astronomical Union (I.A.U.) and the International Union of Geodesy and Geophysics (I.U.G.G.). The I.U.W.D.S. adheres to the Federation of Astronomical and Geophysical Services (F.A.G.S.). The I.U.W.D.S. programme was modified and extended for the I.Q.S.Y. because of the requests of the various I.Q.S.Y. scientific disciplines. *I.Q.S.Y. Instruction Manual*, No. 1 gives all the main details of the World Days Programme.

The designation of World Days and the rapid data interchange activities sponsored by I.U.W.D.S. will continue beyond the I.Q.S.Y., since it is clear that there is a continuing need for many of the services provided ; there will also be continued cooperation between the observatories and the various regional warning centres which carry out the active part of the work. It is expected that, for the most part, the I.U.W.D.S. Steering Committee can keep abreast of the needs of the scientists served and the practicalities of the necessary communications. However, there will be a few problems which will have to be solved, before the date when the I.Q.S.Y. organization disbands, in order to assure that the services provided are responsive to modern needs and are really effective.

1. — *Advisors for Scientific Disciplines or Programmes.*

It has been very effective to be able to turn to specified individuals who serve as discipline reporters or programme correspondents for I.Q.S.Y. The most important area where this has helped has been in the provision of a source of information which can be quoted in programmes of observation recommended to be carried out on World Days, for example, in the International Geophysical Calendar, and also in recommendations for subsequent data interchange. These individuals have also helped to clarify details in the execution of recommendations made by international scientific bodies, and to deal with problems which arise in between meetings. This aspect will become more important in the post-I.Q.S.Y. period when there is a possibility of recommendations coming from I.A.U., I.U.G.G., U.R.S.I., C.O.S.P.A.R., S.C.A.R., etc. The most important fact, however, is that these advisors have a sense of responsibility to see that one or another international organization actually adopts resolutions which suitably express the desires of scientific groups in the area of active international cooperation.

2. — *National Warning Contacts.*

The communications used for the active part of the World Days Programme are quite complicated. The W.M.O. meteorological networks are used mainly for the distribution of worldwide GEOALERTS. Other channels are used for collecting current observations and for distributing current data summaries.

It has been very useful to have, for I.G.Y. and now for I.Q.S.Y., an individual in each country who is knowledgeable on scientific communications and who can act as National Warning Contact. While theirs is not a burdensome task, they do provide a responsible point of contact between the I.U.W.D.S., or the Regional Warning Centres, and the scientific groups in each of the countries that provide or receive information through I.U.W.D.S. channels.

It would be most helpful if the present arrangement for National Warning Contacts could be continued after the I.Q.S.Y. This could perhaps be achieved through the present regional structure of I.U.W.D.S. (that is Regional I.U.W.D.S. Committees with representation arranged largely through the national U.R.S.I. committees), although the number of countries at present represented on I.U.W.D.S. regional committees is only about half the number of countries participating in I.Q.S.Y. Alternatively, one might leave the I.U.W.D.S. regional structure to deal with scientific and policy questions, and retain the existing National Warning Contacts as affiliates to the I.U.W.D.S. itself for purposes of the active and practical operation of the programme.

3. — *Publication Medium.*

With the disbanding of the I.Q.S.Y. organization and the suspension of the publication of *I.Q.S.Y. Notes*, the scientific community will be without a suitable publication for various current aspects of the World Days Programme, namely :

(*a*) records of the declarations of worldwide GEOALERTS ;
(*b*) rapid publication of the abbreviated Calendar Record ;
(*c*) authoritative records of declarations of Retrospective World Intervals.

It is not knwn whether the readers of any of the present U.R.S.I., I.U.G.G. or C.O.S.P.A.R. publications are equivalent in numbers or in interests to those of *I.Q.S.Y. Notes*, and whether these publications can be expected to appear with sufficient frequency and regularity to take the place of *I.Q.S.Y. Notes*.

Alternatively, some space might be obtained in one of the regular scientific or technical journals which have a wide circulation among scientists interested in the various solar-terrestrial disciplines. However, such journals normally prefer not to carry material which is of mainly an administrative character and which is sometimes of short-lived significance. Also, it may be noted that

there is usually a delay of many months between the submission of material to the Editor and the distribution of such journals ; it would be preferable if information of the kind which has been appearing in *I.Q.S.Y. Notes* could be distributed with a delay of perhaps only a month, even if the publication format were to be simpler than that of the usual scientific journals.

Perhaps the solution is for I.U.W.D.S., or some other I.C.S.U. organization, to start a new information bulletin to continue the work of *I.Q.S.Y. Notes*. Such a decision should, of course, be considered very carefully because of the consequent financial implications and perhaps of the need for maintaining a permanent secretariat for this purpose.

The solution of this problem might also be related to whatever solution is reached for continuing the coordination of the World Data Centres. Many of the W.D.C.s are already active in data publication and have regular contacts with many scientists and institutions who require the information which emerges from I.U.W.D.S. activities.

4. — *Detailed Aspects of I.U.W.D.S. Programme.*

There are many detailed problems which the I.U.W.D.S. must consider : for example, the modification or extension of the I.Q.S.Y.-type of Alerts, the choice of data that require rapid interchange, special kinds of Alerts, etc. The I.U.W.D.S. is receptive to suggestions on such matters from all scientists and groups and, after consultation with advisors for the various scientific disciplines, the I.U.W.D.S. uses its best judgement in deciding on the most appropriate measures and it then takes the necessary action. In addition to discussion of the broader policy points mentioned above, the I.U.W.D.S. Steering Committee would appreciate comments on details of the present programme and activities which are under its auspices and also suggestions and recommendations concerning future requirements after the end of the I.Q.S.Y.

INTER-UNION COMMISSIONS

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

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R. L. SMITH-ROSE,
Secretary General.

15 september 1965.

I.Q.S.Y.

IIIrd Assembly

MADRID, MARCH-APRIL, 1965

The Secretariat of I.Q.S.Y. has issued *I.Q.S.Y. Notes*, No. 13, June 1965.

Besides obituary notices on Sir Edward Appleton and Daniel Barbier, the issue contains the Report of the Assembly divided up into sections which are presented in the following order :

1. Opening Ceremony.
2. First Plenary Meeting.
3. Reports of Working Groups.
4. Discussion on Post-I.Q.S.Y. Organization.
5. Meetings of Council for the I.Q.S.Y.
6. Final Plenary Meeting.
7. List of Delegates.
8. Scientific Review Sessions.

Considering the connection with, and their importance for U.R.S.I. future and present activities, it has been found useful to reproduce, totally or partially, some of the Working Group Reports.

Report of Working Group for Ionosphere

(*Chairman* : W. DIEMINGER)

(See *Inf. Bull.*, 151, p. 34)

Report of Working Group for Solar Activity

(*Chairman* : R. MICHARD)

I. — RECOMMENDATIONS

The Working Group on Solar Activity reviewed the present state of I.Q.S.Y. activities in its discipline. The general feeling

was that the solar observations are being carried through satisfactorily.

1. Solar Patrol.

The Working Group expressed its concern about the continuation of the patrol observations after the I.Q.S.Y. period. The following two resolutions were therefore adopted.

1.1. The Working Group emphasizes the importance of the solar H*a* flare patrol observations, both for research purposes and for meeting operational needs arising from other disciplines : for example, space research and cosmic ray observations, and *recommends* that the level of H*a* patrol observations be maintained after the conclusion of the I.Q.S.Y. and that reports on the occurrence of major solar flares be given with the shortest possible delay.

1.2. The Working Group *notes* that a certain number of gaps are still present in the world-wide patrol observations of solar radio emissions and *recommends* that all such patrol observations be continued after the I.Q.S.Y. period and that existing observing programmes be extended or new programmes initiated in order to fill in the existing gaps, and further *recommends*, in particular, an improvement of the interferometric and polarimetric radio patrol coverage of the sun which is considered highly desirable.

2. Observations from Space Vehicles.

The Working Group has noted the increasingly important role that observations of the sun's far ultraviolet and X-ray spectrum play in the continuous watch on solar activity. It therefore accepted the following recommendations :

2.1. The Working Group emphasizes the fundamental importance of the programme for monitoring solar X-ray emissions from space vehicles now being carried out by the U. S. Naval Research Laboratory and *recommends* that these observations be continued throughout the next solar cycle.

2.2. The Working Group expresses its interest in all those programmes of solar observation that use space vehicles and that will yield data on a semi-regular or routine basis, and *recommends* that the results of such observations be made available to the scientific community through World Data Centres, and within a reasonably short time after the epoch of observation.

2.3. The Working Group *notes* the usefulness of the transmission, from space vehicles, of real-time telemetry signals containing data on solar far-ultraviolet and X-ray emissions, and the reception of these signals at numerous ground stations and *recommends* the establishment of new facilities and the initiation of new programmes for the reception of these signals.

II. — Organization of International Cooperation in solar-terrestrial physics after I.Q.S.Y.

1. The Working Group favours the continuation of this post-I.Q.S.Y. international cooperation in the studies of solar-terrestrial relations after I.Q.S.Y. with no decrease in its extent or efficiency.

2. The Working Group is of the opinion that successful organization and maintenance of this cooperation calls for the following requirements :

(*a*) The scientific initiative and advice should come from the Scientific Unions of I.C.S.U. through their competent Commissions or Working Groups. These bodies should play the role at present played by the Discipline Working Groups at I.Q.S.Y. Assemblies.

(*b*) An active inter-Union Committee, including representatives of the Unions and of appropriate individual disciplines, is necessary to provide the proper coordination of activities in various related fields. The closest cooperation with other organizations with similar aims, such as C.O.S.P.A.R., etc., should be insured.

(*c*) A permanent secretariat will be necessary.

(*d*) A periodical publication having a wide distribution (similar to *I.Q.S.Y. Notes*) would be very useful.

(*e*) It will probably also be necessary to define with precision the scientific fields to be covered by such a semi-permanent plan for cooperation.

3. The Working Group is aware of the existence of the C.I.G. and of the I.U.C.S.T.R., but considers that the present organization of these Committees does not meet the above requirements.

Report of Working Groups for Space Research and Aeronomy

(*Chairman* : H. FRIEDMAN)

(*Abstracts*)

1. — ANNALS OF THE I.Q.S.Y.

The inclusion of the following items in *Annals of the I.Q.S.Y.* was considered :

(*a*) A calendar of rocket and satellite launchings made during 1964 and 1965, and devoted to I.Q.S.Y. studies, including dates of successful operation, and lists of the types of observations made.

(*b*) A bibliography of papers, together with abstracts, describing work carried out in connection with the I.Q.S.Y. programme.

(*c*) Comprehensive reviews of space research activities during the I.Q.S.Y.

It was suggested that the preparation of (*a*) and (*b*) might be arranged by C.O.S.P.A.R. and it was agreed to submit these suggestions to the Executive Committee of C.O.S.P.A.R. in Buenos Aires in May 1965.

Dr. Martin (Chairman, I.Q.S.Y. Publications Sub-Committee) mentioned that it was likely there would be an Editorial Board for the *Annals* on which C.O.S.P.A.R.-I.Q.S.Y. interests could be represented. He also stated that, in the choice of reviewers for (*c*), the Editorial Board would look to C.O.S.P.A.R. for advice.

2. Several brief informal reports were presented on the progress made in several space research projects. These covered investigations made using space vehicles and also the potentialities of the Arecibo radar installation.

2.1. — *Aeronomic Properties* (N. W. ROSENBERG).

2.2. — *Density of the Upper Atmosphere* (P. G. JACCHIA).

2.3. — *Ionospheric Physics* (R. BOURDEAU).

2.3.1. *D Region.* — During the period, the Goddard Group obtained a total of six electron-density/height profiles using ground-to-rocket radio propagation techniques. The maximum density of the D-region was observed at 75 km (N_e = 700 cm-^{3}) for middle-latitude daytime conditions. Successful Lyman-*a* profiles were simultaneously obtained.

The same group, in collaboration with Scandinavian workers, obtained four profiles in Norway during an auroral absorption event.

2.3.2. E *Region.* — Four pairs of payloads were successfully launched from shipboard at the geomagnetic equator to study the « electrojet ». In each pair, one instrument measured N_e and T_e and the other the magnetic field.

2.3.3. *Satellites.* — Since 1962, Alouette 1 has continued to provide four hours of topside soundings per day.

The fixed-frequency topside sounder (Explorer XX) was launched in August 1964 and has been providing continuous topside information ever since, with the main emphasis on the structure of ionospheric irregularities.

The polar ionosphere beacon satellite (Explorer XXII) was launched in October 1964. Some 30 countries are actively engaged in determination of electron content.

2.6. — *The Arecibo Radar Installation* (W. GORDON).

Ionospheric observations at Arecibo by the radar back-scatter technique are yielding electron density profiles (100-2000 km), electron and ion temperatures (150-1500 km), ionic composition (250-1500 km), and the horizontal and vertical structure of travelling ionospheric disturbances (100-800 km). The resolution of the observations in height and time vary from 6 km and 10 sec at the lowest heights, to 150 km and 5 minutes at the greatest heights.

The recent (January 1965) successful observation of the plasma frequency as a line in the spectrum backscattered from heights of 150 to 600 km provides an important and independent check of the measurement of electron density. The plasma line is observed as a modulation of the transmitted frequency at a frequency offset by an amount equal to the plasma frequency. The line is only observed during the daytime ; this observation agrees with the prediction of Salpeter and Perkins that the line is enhanced by the presence of electrons in the 1-30 ev range.

Report of the Working Group on World Days

(*Chairman* : A. H. SHAPLEY)

The Working Group on World Days reviewed the present state of the I.Q.S.Y. services in consultation with each of the I.Q.S.Y. Discipline Working Groups. It was found that the I.Q.S.Y.

programme was working satisfactorily with respect to the use of the World Days marked on the Geophysical Calendar, to the use of the Advance and Geophysical Alerts and to the selection of Retrospective World Intervals.

The requirements for the post-I.Q.S.Y. period were discussed at a Working Group meeting at which members of each of the Scientific Working Groups were present. The dates selected for the 1966 Geophysical Calendar are final but modifications were made to the printed recommendations for scientific programmes given in the planning edition. The operational edition of the 1966 Geophysical Calendar containing these modifications will be issued mid-1965. The types of alerts necessary for the post-I.Q.S.Y. period were considered ; the numbers and types of alerts will be reduced in the light of both discipline needs and the expected level of solar activity.

Detailed plans for 1966 will be issued by I.U.W.D.S. as a new World Days Manual or as a supplement to the I.Q.S.Y. World Days Manual.

RESOLUTIONS :

1. The Working Group on World Days expresses its appreciation of the work performed at the I.U.W.D.S. World Warning Agency and at the Regional Warning Centres in the implementation of the I.Q.S.Y. scheme of alerts for special observing periods. The World Warning Agency decisions have been made very satisfactorily and have been based on the advice received from the Regional Warning Centres.

2. The Working Group notes with satisfaction the efficient help provided by the W.M.O. communications network in the worldwide distribution of the GEOALERT messages.

3. The Working Group expresses its appreciation of the efficient collection and dissemination, by the national communications services, of daily messages relating to alerts and solar-geophysical activity and the coordinating role played by the National Warning Contacts.

4. The Working Group :

(*a*) *notes* with great satisfaction the prompt publication of the Abbreviated Calendar Records in *I.Q.S.Y. Notes* ;

(*b*) expresses its appreciation to the I.U.W.D.S. Deputy Secretary for the compilation of the relevant data, and to the many

individual scientists who provided the required information promptly ;

(*c*) *recommends* that the publication of such Calendar Records should be continued after the close of the I.Q.S.Y.

Report of Working Group on Data Interchange and W.D.Cs

(*Chairman* : H. Odishaw)

(*Abstracts*)

1. — Review of Status of Interchange, 1960-1963.

As indicated in the reports of W.D.C.-A and W.D.C.-B, data for the period 1960-1963 are still being collected by the centres. While a significant amount of data has already been sent to the centres, in accordance with the C.I.G. « Guide », it was noted that the collection is not yet completed.

The Working Group therefore encourages the laboratories that have taken part in I.G.Y. and I.Q.S.Y., to transmit to the W.D.Cs, as soon as practicable, those data from 1960-1963 that are available.

2. — Review of I.Q.S.Y. Data Interchange.

The Working Group noted that some I.Q.S.Y. data are now being collected by the centres, as indicated in the reports of W.D.C.-A and W.D.C.-B and that, while data flow is quite up to-date in some disciplines, it is lagging somewhat in others.

The Working Group urges all I.Q.S.Y. Committees to take appropriate steps to ensure that data collection proceed as closely as possible to the I.Q.S.Y. data exchange schedule so that the I.Q.S.Y. data collection may be completed as soon as possible after the close of the observational period.

3. — Future Plans for Data Exchange through the W.D.Cs.

The Working Group discussed the recommendations from the discipline Working Groups and wishes to report the following recommendations from the several disciplines.

3.2. — *Solar Activity.*

The Working Group on Solar Activity supports any efforts that can be made to keep data interchange in various disciplines

of solar-terrestrial physics at its present satisfactory level, or to improve it where needed.

In those fields of solar activity where preliminary elaboration and analysis of the data are both needed and feasible, this task is often being done by W.D.Cs called « principal W.D.C. ». The label S.W.G.C. can be put on these institutions ; on the other hand, the Kiev Observatory is S.W.G.C. for Comets, without being a W.D.C. at the same time. The present situation is considered satisfactory and there appears to be no need to establish new S.W.G.Cs for the solar activity disciplines.

3.3. — *Ionospheric Physics.*

The W.D.Cs A, B and C should be maintained with the current rules of operation until at least the end of 1967. Their future should be reconsidered at the IVth I.Q.S.Y. General Assembly in 1967, in the light of possible future developments of data handling and exchange. It should be noted that the Working Group on Ionosphère approved the recommendations for data exchange for 1966 in accordance with the I.U.W.D.S. Calendar ; however, for the following years, it recommends some changes which will later be proposed as changes in the « Guide ».

The possibility of a S.W.G.C. for Whistlers is being considered by Dr. M. C. Morgan, Dartmouth College, U. S. A.

Report on I.Q.S.Y. Publications

(Dr. D. C. Martin, *Chairman*,
I.Q.S.Y. Publications Sub-Committee)

During the two years since the IInd I.Q.S.Y. Assembly, the I.Q.S.Y. Publications Sub-Committee has been active in supervising the publication of *I.Q.S.Y. Notes* and *I.Q.S.Y. Instruction Manuals* and, more recently, in making plans for the publication of *Annals of the I.Q.S.Y.* These activities are summarised in the following paragraphs.

1. — I.Q.S.Y. Instruction Manuals.

By the end of 1964, nine *I.Q.S.Y. Instruction Manuals* had been issued by the I.Q.S.Y. Committee. The two most recent

were : No. 8 on the observation of comets and No. 9 on sounding rocket research techniques.

2. — I.Q.S.Y. NOTES.

3. — ANNALS OF THE I.Q.S.Y.

The most important recent activity of the Publications Sub-Committee relates to the plans for the publication of a record of the I.Q.S.Y. enterprise in a series of volumes to be entitled *Annals of the I.Q.S.Y.* In view of the advice and recommendations received from the Discipline Reporters and from the Working Groups which met in Madrid, the provisional list of contents of the *Annals*, as shown in I.Q.S.Y. 4(65), has been revised and the contents now envisaged are as follows :

(1) The material contained in the *I.Q.S.Y. Instruction Manuals*, but excluding the tables in Manual No. 10 (Manual No. 9 will also be excluded : June 1965).
(2) The Calendar Record for the years 1960-1963.
(3) The Calendar Record for 1964 and 1965, and a summary of the Alerts issued and the Retrospective World Intervals declared during the I.Q.S.Y.
(4) A summary of the development of the I.Q.S.Y. programme and a description, in tabular form, of the observations actually achieved by the Participating Committees, including a list of the stations which were active during the I.Q.S.Y.
(5) The final catalogue of I.Q.S.Y. data held in the W.D.Cs and elsewhere, and a bibliography of papers dealing with the I.Q.S.Y.
(6) Three or four volumes containing :
   (*a*) a specially prepared critical review of recent progress in each of the I.Q.S.Y. disciplines ;
   (*b*) the papers to be presented at the IVth I.Q.S.Y. Assembly in 1967 and at the proposed symposium on the C.S.S.A.R. ;
   (*c*) papers presented at other symposia on solar terrestrial relations.
(7) Recommendations have been made by several Working Groups that tables of observational data should be published in the *Annals* but this question has been referred to the I.Q.S.Y. Committee for further consideration.

In order to supervise the production of the *Annals* and to ensure the high quality of the contents, the Publications Sub-Committee

has proposed the appointment of an editorial board. In addition, in order to provide continuity after the termination of the I.Q.S.Y. Committee in 1967, the establishment of a central editorial office is envisaged and funds will be allocated specifically for this purpose. As a result of decisions made in the last few days, negotiations with a publishing house have now been initiated.

I.Q.S.Y. Notes

I.Q.S.Y. Notes, No. 14, September 1965, has been issued. We quote from the contents the following papers :

— The total solar eclipse of 30th May 1965, by G. RIGHINI.
— A summary of the coverage of the solar radio patrol, by A. D. FOKKER.
— Calculation of electron density/height profiles in the ionosphere.

N(h) Programmes planned for the I.Q.S.Y. (see *U.R.S.I. Information Bulletin*, No. 151).

— Bibliography for the I.Q.S.Y.
— World days programme (I.Q.S.Y. GEOALERT messages issued May 17-July 31, 1965).
— Abbreviated calendar record, March-April 1965.
— National Reports.

I.Q.S.Y. NATIONAL PROGRAMMES FOR IONOSPHERIC RESEARCH

(From *I.Q.S.Y. Notes*, No. 14, September 1965)

Austria

At the Ionospheric Observatory, Graz, vertical soundings are made every hour and on World Days or, when disturbances of the ionosphere occur, every quarter of an hour. The hourly values of foF or foF2 and the monthly means for all other parameters are published in monthly tables. f-plots exist for all World Days and are transmitted to the W.D.C. at Slough four times a year.

Observations of the Faraday effect on the frequencies 40 and 41 MHz have been made since the first orbits of the Beacon satellite S-66 (respectively BE-B). The two orbits which are nearest to the station are usually recorded, sometimes even three or four orbits. Up to now, some peculiar cases have been evaluated. The systematic evaluation of all records has been initiated. It is intended to observe also the radar satellite BE-C which is to be launched in the near future, in order to obtain additional data on the electron content of the ionosphere.

Brazil

Comissão Nacional de Atividades Espaciais

1. — Ionospheric Studies with Satellites.

Two reports were prepared : (i) « Ionospheric Electron Content Measurements in Regions of Low Magnetic Dip Angles and through the Brazilian Magnetic Anomaly » (to appear in Space Research V, North Holland Pub.) ; (ii) « Differential Faraday Measurements of Electron Content with the S-66 Satellite » (submitted to *J. Atmos. Terr. Phys.*). More than 600 satellite passages are now being analysed for the determination of electron content. Recordings were also made using the telemetry channel of the Canadian topside sounding satellite Alouette. The data are at present being analysed for true height electron profiles and also for preliminary mapping of the earth's magnetic field through the Brazilian anomaly. The recordings of the 20, 40 and 360 Mc/s beacons of the S-66 are also being analysed for scintillation phenomena associated with equatorial, middle and high latitude regions. Most of this research has been done with the collaboration of Stanford University and Goddard Space Flight Center, U. S. A.

2. — Cosmic Noise Method of Absorption Measurements.

A 30 Mc/s riometer was operated continuously. The results were published in four data summaries : « Absorption Measurements with Riometers », Reports Nos. LAFE-12, 16, 17 and 22. A photographic display of the recordings for the period January-March 1964 appeared in the No. 1 issue of the Geophysics and Space Data Bulletin of A.F.C.R.L. Also a research note entitled « Effects

of Solar Radio Burst on Riometer Records at 30 Mc/s » has been submitted to J. Geophys. Res.

3. — Magnetic Field Measurements.

The measurements relating to the antipodal and round-the-world propagation experiment have been reduced and are at present being analysed at the Radioscience Laboratory of Stanford University ; a report will be forthcoming in the very near future.

4. — Atmospheric Noise.

Continuous recordings of atmospheric radio noise have been made using an N.B.S. A.R.N.-2 system with frequencies of 0.05, 0.20, 0.50, 1.0, 2.0, 5.0, 10 and 20 Mc/s. Two data summaries entitled « Atmospheric Noise Measurements » (LAFE-23 and 24) have been published, and one report is also in preparation.

Escola Politecnica de Sao Paulo
Centro de Radiofisica (C.E.R.F.)

5. — Vertical Ionospheric Soundings.

During 1964, C.E.R.F. has made daily soundings of the ionosphere each half hour and each quarter hour on R.W.D.

6. — Scaling of Ionospheric Data.

C.E.R.F. is scaling the following data for São Paulo and Natal : foE, foEs, foF1, foF2, *h'*E, *h'*F, *h'*F2, (M3000)F2. (M3000)F1 and *f*min.

f-plots are made daily for Natal and on R.W.D. for São Paulo.

Data and ionograms for Natal are sent to Boulder Laboratories, National Bureau of Standards, prior to publication. Data from São Paulo and Natal will be sent to the World Data Centres as soon as published. No copies of ionograms will be sent.

Instituto de Pesquisas da Marinha
(Brazilian Navy Research Institute)

7. — Ionospheric Sounder.

Operation of one ionospheric sounder, received from the National Bureau of Standards, in coordination with similar work done at the University of São Paulo.

8. — Investigation of ionospheric radio-propagation phenomena in equatorial latitudes on signals received in Monrovia, Liberia. This programme is supported by the National Bureau of Standards. Results of measurements are sent to the N.B.S.

VI. — Solar activity.

Escola Politecnica de São Paulo
Centro de Radiofisica (C.E.R.F.)

1. — The proposed programmes are not yet in operation owing to lack of facilities.

Centro Brasileiro de Pesquisas Fisicas

2. — This Centre reports cancellation of its cosmic rays and solar radioastronomy programs on the grounds that the equipment available did not prove to be up to the desired standard of efficiency. An attempt is being made to retrieve operation on the basis of support from other agencies.

Canada

1. — HF Swept-Frequency Ionosondes.

This programme remains unchanged. Complete responsibility for this work has been transferred from the Defence Research Board to the Department of Transport.

2. — HF Fixed-Frequency Ionosondes.

The Resolute Bay installation began operation in late 1963. Operations at Churchill will commence about February 1965.

3. — Riometers.

Measurements at Coral Harbour have been terminated. The north-south chain will be maintained but several riometers will be closed down late in 1965.

4. — LF/VLF Fixed-Frequency Receivers.

There has been no change in this part of the programme.

5. — HF Oblique Sounders.

Operation of these two circuits was stopped in March 1964.

6. — ALOUETTE SATELLITE.

Instruments on the space craft continue to operate without any serious degradation and ionospheric studies using the satellite data from a major part of Defence Research Telecommunications Establishment studies.

Ceylon

The following amendments should be made to the earlier programme.

Absorption (*A*1) :

(*a*) At Colombo the noon absorption will be measured daily at the three frequencies : 2.0, 2.2 and 2.6 Mc/s.

(*b*) Night observations will be made at least once a week on the same frequencies.

(*c*) Diurnal variation of absorption will be determined on R.W.D.s

Ionospheric data are sent to all W.D.Cs. Nett radiation flux at the surface is sent to Voekov Central Geophysical Observatory, Leningrad, and Radar/R/S data to the International Institute of Meteorology, Poona, India, for publication.

Republic of China (Taiwan)

The vertical sounder (N.B.S. Type C-2) at Taipei continues its regular operation as usual, and since April 1964 the data obtained have been reduced according to Programme A for the I.Q.S.Y. The station, however, will be moved to Chung-li, about 30 km south-west of the old station, in order to improve the quality of ionograms, especially for lower frequencies.

République Démocratique du Congo (Léopoldville)

Instruments à notre disposition :

1 sonde type Wadley à chacune des stations de Binza, Karavia et Bunia.

5 Flofilms (dont 2 en panne) centralisés à Binza.

Programme d'observations :

à Binza :

Sondage à incidence verticale par balayage de 1 à 20 MHZ en 7 secondes, à une cadence de 1 sondage toutes les 15 minutes.

Pendant les R.W.D. et les W.G.I., la cadence est portée à 1 sondage toutes les 5 minutes et les jours d'alerte à 1 sondage par minute.

à Karavia :

La sonde remise en état en novembre 1964 est de nouveau en panne depuis janvier 1965.
Le dépannage est en cours.

à Bunia :

Activités complètement arrêtées, la sonde étant en panne. Projet de dépannage pour la même période que pour le géomagnétisme.

Publication des Mesures. — Les ionogrammes des 3 stations, rassemblés à Binza, sont dépouillés et publiés systématiquement environ 30 jours après le mois d'observation. La publication donne les valeurs horaires des éléments suivants :
foF2, foF1, foE*s*, foE, *f b*E*s*, *f*min
*h'*F2, *h'*F1, *h'*E*s*, *h'*E
MUF(3000)F2, M(3000)F2
Les h_e et q_e sont encore à l'étude.

N. B. — Comme dans les autres domaines, la publication des données ionosphériques souffre d'un grand retard dû au manque de matériel au bureau d'Edition.

Czechoslovakia

Measurements at 40 Mc/s of meteor forward scatter have been added to the original programme, which is being regularly fulfilled. The results of observations are sent monthly to the W.D.Cs in the form of the bulletin « Ionospheric data of observatories Průhonice and Panskà Ves », with a four-month delay.

East Africa

1. — Vertical Incidence Soundings.

Vertical incidence soundings are made at quarter-hour intervals on World and Special Days and at hourly intervals on other days. In the early part of 1964, equipment failures caused some gaps in the records but, following improved servicing, it is expected that failures can be rectified quickly in future.

An ionogram is obtained during each pass of the S-66 satellite in connection with the Faraday rotation experiment.

2. — Faraday Rotation Experiment.

Regular recording of transmissions from S-66 on 20, 40 and 41 Mc/s were begun on 10th October 1964. About 70 % of close passes have been successfully recorded.

It is hoped to record all passes of the SAN MARCO satellite which will be launched from the coast of Kenya in an equatorial orbit.

Preliminary approximate computations of the diurnal variation of electron content have been made for the months October 1964 to January 1965. More accurate computations and comparisons with data from ionograms are in progress.

3. — Drift Observations.

Horizontal drift measurements have been delayed because of equipment difficulties.

France

1. — Sondage a incidence verticale.

(*a*) *Stations du Groupe de Recherches Ionosphériques* (*A.I.S.C. et C.N.E.S.*) : A. Lebeau (G. Pillet).

Les stations de Bangui, Garchy, Port-aux-Français et Dumont d'Urville fonctionnent régulièrement.

De nouveaux sondeurs verticaux (type suédois « Magnetic AB » J5W) équiperont au début de 1965 les stations de Port-aux-Français et Garchy, et au début de 1966 à la station de Terre Adélie.

Les données dépouillées de 1964 et ultérieures seront diffusées aux Centres mondiaux à partir de janvier 1965.

(*b*) *Stations de la Division des Prévisions Ionosphériques* (*A.I.S.C. et Labo*) : P. Halley.

Sondages quadrihoraires à Dakar, Tahiti et Djibouti. Sondages semi-horaires à Tananarive.

Un prototype de nouveau sondeur vertical est en voie d'achèvement, quelques mises au point et quelques modifications sont encore nécessaires.

Des antennes neuves ont été mises en place à Djibouti.

La mise en place d'antennes neuves à Tahiti est en cours.

(*c*) *Station de Poitiers* (*A.I.S.C. et Labo*) : R. RIVAULT.

La station a été installée sur le nouveau terrain de Poitiers en octobre 1964.

2. — ABSORPTION IONOSPHÉRIQUE.

(*a*) *Sondeur d'absorption* (*A.I.S.C.*) : A. LEBEAU (G. PILLET).

Des sondeurs d'absorption à 4 fréquences seront installés au début de 1965 à Garchy et Port-aux-Français, où fonctionnent actuellement des sondeurs à 2 fréquences (le dépouillement en sera diffusé en 1965). L'installation d'un autre sondeur à 4 fréquences est envisagée à Dumont d'Urville au début de 1966.

2(*b*)1. — *Riomètres* (*A.I.S.C.*) : A. LEBEAU (G. PILLET).

Un riomètre à 4 fréquences (6,5 - 10,1 - 15,5 - 25 MHz) est installé à Port-aux-Français depuis février 1964. Un autre riomètre identique sera installé à Dumont d'Urville au début de 1965 (le dépouillement de Port-aux-Français sera diffusé en 1965).

2(*b*)2. — *Riomètres* (*A.I.S.C.*) : P. HALLEY.

Un riomètre est en cours d'acquisition pour être installé à Tahiti.

(*c*) *Mesures de champ d'émetteurs* (*A.I.S.C. et Labo*) : P. HALLEY.

Des mesures de champ ont été faites à partir des émissions de Dakar. Elles ont dû être interrompues à la suite d'un déréglage des appareils. Elles seront reprises incessamment. Un second émetteur est en cours d'installation à Tahiti.

3. — VENTS IONOSPHÉRIQUES :

(*a*) *Etude des vents ionosphériques au niveau de la couche E* (*Labo*) : A. HAUBERT.

(*b*) *Etude des perturbations itinérantes par diffusion arrière* (*C.N.E.S. et Labo*) : J. DELLOUE.

(*c*) *Etude des traînées météoriques* (*A.I.S.C. et C.N.E.S.*) : A. SPIZZICHINO.

Le dispositif expérimental mis en place comprend : une liaison par diffusion ionosphérique à 39 MHz entre La Haye (Hollande) et Toulon (Var) ; un radar météorique, situé à Garchy (Nièvre), à la fréquence de 29 MHz ; un sondeur ionosphérique vertical situé à Dijon (Côte d'Or).

Les buts scientifiques sont : l'étude des vents dans la basse ionosphère ; l'étude des couches E sporadiques ; (l'étude astronomique des orbites de météorites).

Résultats obtenus en 1964.

La liaison La Haye-Toulon est équipée d'un goniomètre depuis le début de 1963. Une série de mesures systématiques a été effectuée de janvier à avril et de juin à août 1964. Environ 200.000 échos météoriques ont été enregistrés. La goniométrie permet de localiser les traînées météoriques dans l'espace et de reconstituer partiellement leur direction, d'où l'on remonte aux trajectoires des météorites. Ces observations font en outre apparaître des déformations systématiques des traînées, dues aux mouvements de l'atmosphère. Leur dépouillement est en cours.

Le même goniomètre a permis d'observer quelques couches E sporadique, faisant apparaître une inclinaison irrégulière de ces couches et des variations de son altitude : ces résultats, en cours de dépouillement, doivent être confrontés avec les données du sondeur ionosphérique de Dijon, situé au point milieu de la liaison.

D'autre part, un dispositif d'enregistrement du champ et de dépouillement entièrement numérique a été mis au point et est devenu opérationnel en octobre 1964 : environ 10.000 échos météoriques par jour pouvant être enregistrés, classés et analysés automatiquement. On pense en particulier reprendre ainsi, en étendant l'observation à quelques millions d'échos, des études qui ont été déjà effectuées sur un échantillonnage plus restreint : étude de l'altitude des échos météoriques, étude des cisaillements de vents dans la basse ionosphère.

Le radar météorique en ondes entretenues a permis l'observation d'échos météoriques dès le mois de février 1964 ; on l'équipe actuellement d'un goniomètre, et l'ensemble pourrait être opérationnel en janvier 1965. Il fournira alors des mesures de vents ionosphériques ; la goniométrie combinée à la mesure de distance fournira une localisation du point de l'espace où le vent a été mesuré.

Prévisions de développements pour 1965.

Liaison La Haye-Toulon. Une station d'émission autonome à La Haye est en cours d'installation. Sa fréquence d'émission étant différente de celle de la station précédente (30,5 MHz), quelques modifications doivent être apportées à la station de réception de Toulon au début de 1965. Les enregistrements seront poursuivis pendant toute l'année 1965, avec goniométrie et analyse numérique de l'enregistrement de champ.

Radar météorique et sondeur. Devenu opérationnel au début de 1965, le radar fournira d'une manière continue des profils de vents entre 90 et 110 km d'altitude. Ces profils de vents seront confrontés avec : une étude théorique générale de la dynamique de la basse ionosphère ; les observations des couches E sporadique par le sondeur de Dijon, afin d'étudier le rôle des vents dans la formation de E sporadique (campagne prévue de mai à septembre 1965) ; les déformations des traînées météoriques observées sur la liaison La Haye-Toulon.

4. — PHÉNOMÈNES A TRÈS BASSE FRÉQUENCE.

(*a*) *Enregistrement permanent des sifflements naturels* (*A.I.S.C. et Labo*) : R. RIVAULT.

Les enregistrements ont été transférés à la nouvelle station de Poitiers en juillet 1964.

Les données d'apparition des sifflements de janvier à juin 1964, ont été diffusées internationalement en août. Les données de dispersion sont calculées de janvier à mai inclus. Elles seront diffusées à la fin de l'année 1964.

(*b*) *Etude de la structure des sifflements* (*A.I.S.C. et Labo*) : J. DELLOUE.

L'objectif visé est la détermination des directions d'arrivée des sifflements radioélectriques par la mesure des écarts entre les instants d'arrivée d'un même front d'ondes en trois points situés sur le sol, accompagnée de la mesure de la polarisation.

Trois parties ont été prévues : *a*) systématisation des mesures antérieures, effectuées avec un triangle de stations séparées par des distances de l'ordre de la longueur d'onde ; *b*) application de la méthode à un triangle de petites dimensions grâce au développement de techniques électroniques spéciales ; installations d'autres triangles distants les uns des autres de quelques 100 km pour obtenir une localisation du point d'émergence des sifflements hors de l'ionosphère et une idée de la forme du front d'onde.

Résultats et réalisations en 1964.

(i) Mesures sur bases longues :

Des mesures simultanées sur les deux triangles bases longues d'Orléans et de Garchy ont été conduites à plusieurs reprises. La saison des sifflements a été particulièrement peu propice, l'occurrence ne devenant notable qu'à partir de février 1964.

Une seule nuit a été favorable et de nombreux sifflements ont pu être observés.

L'effet entrevu en juillet 1963 se confirme : les phénomènes observés à 130 km de distance sont totalement différents. Des décalages importants dans le temps (plusieurs millisecondes, ou même dizaines de millisecondes) sont observés entre les arrivées d'ondes pouvant être considérées comme faisant partie d'un même sifflement, à Garchy et à Orléans. De tels retards ne semblent pouvoir s'expliquer que par des différences de trajectoires exosphériques : cette hypothèse et ses implications sont actuellement l'objet de calculs (thèse de M. Garnier). Une publication aux Comptes-Rendus est en préparation.

Vu l'indépendance des phénomènes observés aux deux centres, l'utilisation de deux réseaux quatre bases s'est révélée indispensable. La réalisation et la mise en place de ces bases ne seront pas possibles avant fin 1965.

(ii) Appareillage bases courtes :

L'obtention de la précision désirée dans la mesure de retards très petits (de l'ordre de 1/10e de microseconde) entre deux formes d'ondes identiques, transitoires et complexes, est extrêmement délicate.

On peut néanmoins considérer que les performances désirées sont actuellement obtenues. Une implantation de bases courtes a été faite à la station de radio astronomie de Nançay et des mesures sur atmosphériques ont donné des résultats très satisfaisants. On peut envisager une installation définitive de ce triangle pour le printemps 1965.

(*c*) *Enregistrement d'émissions radioélectriques à très basse fréquence* (*A.I.S.C.*) : B. Decaux (M. Reyssat).

Un récepteur de phase pouvant recevoir les émissions de NBA ou GBR a été installé à Port-aux-Français en janvier 1964 où l'enregistrement continu a été effectué depuis cette date ; il a été interrompu en juin 1964 en ce qui concerne NBA, par suite du changement de fréquence de cet émetteur.

L'enregistrement continu des émissions TBF stabilisées en phase se poursuit à Bagneux (sur les émissions de GBR, NBA, NPW et WWVL).

Un récepteur adapté à la réception de 3 émetteurs TBF différents a été réalisé en 1964. Il sera installé à Port-aux-Français en janvier 1965.

(*d*) *Enregistrement des phénomènes à extrêmement basse fréquence (C.N.E.S. et A.I.S.C.)* : R. GENDRIN.

La mesure des deux composantes EW et NS du champ magnétique à Chambon-la-Forêt par fluxmètre intégrateur type Stefant, a permis la mise en évidence d'une différence entre les variations diurnes E-O et N-S, pour le mode fondamental de résonance de la cavité terre-ionosphère, différence parfaitement interprêtée dans le cadre des théories admises.

La comparaison pour les différents harmoniques est en cours.

On poursuivra en 1965 à Chambon-la-Forêt l'enregistrement des 2 composantes et on mettra au point un système d'analyse capable de suivre la variation en fréquence du pic des résonances.

Ayant déterminé à l'aide des deux composantes et de plusieurs harmoniques la position des principaux foyers orageux, la mesure précise de la fréquence doit permettre à la lumière des théories les plus récentes de suivre les perturbations ionosphériques telles que S.I.D., P.C.A., etc. (cf. aussi V.7(*b*)1).

5. — BRUITS ATMOSPHÉRIQUES.

(*a*) *Enregistrement du niveau moyen des atmosphériques (A.I.S.C.)* : F. CARBENAY.

Les enregistrements se poursuivent aux stations de Meudon, Bangui, Tananarive, Tahiti, Port-aux-Français.

Des équipements complémentaires des installations d'enregistrement d'atmosphériques des stations de Meudon, Bangui, Ivato et Tahiti ont été réalisés.

La station de Meudon, entièrement équipée avec ces équipements (compteur intégrateur), est en fonctionnement depuis juillet 1964.

Les équipements de Bangui, Ivato et Tahiti seront installés en 1965.

(*b*) *Enregistrement du bruit atmosphérique sur 27 kHz (A.I.S.C. et Labo)* : P. HALLEY.

Les observations se poursuivent à Saclay. Deux récepteurs de bruit seront installés en 1965 à Tananarive et Tahiti.

6. — OBSERVATIONS DES EFFETS IONOSPHÉRIQUES D'UNE ÉCLIPSE DE SOLEIL (A.I.S.C. et Labo) : P. HALLEY.

Les effets ionosphériques de l'éclipse de soleil du 30 mai 1965 seront observés à Tahiti.

7. — Expériences entre points conjugués.

(*a*) *Expériences entre la France et l'Afrique du Sud* (*A.I.S.C.*).

1. Perturbations magnétiques : R. Schlich (cf. III.4).

2. Guidage Géomagnétique en HF : F. du Castel.

Un émetteur à impulsions longues de 150 kW, fonctionnant entre 8 et 12 MHz, a été installé à La Turbie en août 1964. Il rayonne par un réseau de 16 dipôles dans la direction du champ magnétique. Un ensemble récepteur est installé au voisinage du point conjugué de La Turbie, à Grahamstown, en novembre 1964. Synchronisé avec l'émetteur à l'aide de l'émetteur TBF de NBA (24 kHz, Panama), il doit permettre de rechercher une propagation guidée le long du champ magnétique terrestre.

3. Guidage Géomagnétique en TBF : J. Delloue.

Le but proposé est de mettre en évidence la propagation suivant le mode des sifflements de signaux émis par l'émetteur ondes longues de Saint-Assise et reçus au voisinage du point conjugué, au sud de l'Afrique. La corrélation entre l'observation de ces échos gyroélectriques et l'occurrence des sifflements d'origine naturelle dans la même région du spectre doit également être étudiée.

Réalisation effectuée.

Un ensemble destiné à l'Afrique du Sud a été élaboré au cours du premier semestre 1964. Afin d'éliminer la résiduelle du FUB dont l'amplitude est voisine de celle des échos gyroélectriques attendus, ces derniers sont captés par un premier récepteur associé à un cadre placé à l'extinction de l'onde directe. Un second récepteur couplé à un cadre perpendiculaire reçoit à fins de synchronisation cette onde directe.

Un récepteur bande large couplé à un troisième cadre est muni d'une accentuation des aiguës pour compenser le manque d'énergie des sifflements aux fréquences supérieures à 10 kc/s.

Les informations provenant de ces trois canaux sont enregistrées en double piste sur bande magnétique grâce à un système de transpositions de fréquence.

Un démodulateur destiné à être utilisé en Afrique du Sud a été réalisé ; il permet de restituer les deux voies correspondant à FUB ; le dépouillement sonographique des sifflements n'étant pas gêné par ces dernières, il n'est pas nécessaire d'avoir un circuit qui isole les sifflements.

On a associé à cet ensemble un second magnétophone et un autre dispositif de programmation qui effectue pour les besoins du Professeur Rivault des enregistrements horaires de routine des sifflements.

Pendant les mois de juillet-août ce matériel a été installé à Grahamstown. Depuis lors, les enregistrements continuent de façon systématique grâce à l'aide de l'Université Rhodes (Prof. GLEDHILL).

Résultats obtenus.

Pendant les mois de juillet-août, des échos gyroélectriques ont été obtenus à plusieurs occasions, certains sont d'amplitude grande. L'étude détaillée de ces échos est en cours. Les deux récepteurs FUB ont donné toute satisfaction, le champ moyen de l'onde directe mesurée en Afrique du Sud est de 400 microv./m.

Des sifflements ont été observés pendant la même période, la courbe de réponse du récepteur semble bien compenser l'atténuation des sifflements pour les hautes fréquences : on pense pouvoir déterminer par extrapolation les fréquences de nez avec une précision moyenne, ce qui nous renseignera sur le trajet suivi par les sifflements enregistrés.

L'étude à partir des enregistrements ramenés d'Afrique du Sud, de la corrélation entre l'occurrence des sifflements et les échos gyroélectriques est également en cours. Les résultats préliminaires vont faire l'objet d'une note aux Comptes Rendus.

Programme pour 1965.

Les enregistrements systématiques continueront jusqu'à la fin de 1964. Ils seront ensuite arrêtés pour quelques mois, pendant la période correspondant au maximum d'activité atmosphérique en Afrique du Sud. Une mission retournera contrôler et remettre en route l'équipement au début de l'hiver local 1965.

Cette mission modifiera l'équipement d'enregistrement des sifflements. On utilisera des magnétophones ayant de meilleures performances, ce qui permettra d'enregistrer jusqu'à 50 kHz et d'atteindre les fréquences de nez. La bande passante du récepteur sera augmentée et la partie transposition de fréquences sera entièrement refaite.

D'autre part, l'installation du nouvel émetteur ondes longues à haute stabilité à Sainte Assise permettra d'effectuer des mesures de variation de chemin optique des échos gyroélectriques. On

envisage donc la construction d'un récepteur qui effectuera la comparaison de phase entre l'écho gyroélectrique et un standard de fréquences local très stable.

4. — Sondages ionosphériques entre points conjugués : F. du Castel.

Une campagne de sondages ionosphériques verticaux rapides entre points conjugués de France et d'Afrique du Sud a eu lieu de janvier à avril 1963 entre Kommetjee (Province du Cap, Afrique du Sud) et un réseau européen comprenant les stations françaises de Garchy, Poitiers, Seissan, Saclay et la collaboration des stations européennes de Tortosa (Espagne), Dourbes (Belgique), Breisach (Allemagne). Des résultats sur les perturbations itinérantes ont été publiées.

(*b*) *Expériences entre les Iles Kerguelen et l'Europe du Nord.*

1. — Phénomènes EBF (A.I.S.C. et C.N.E.S.) : R. Gendrin.

Un fluxmètre intégrateur de type Stéfant a été installé à Port-aux-Français en janvier 1964. Il enregistre la composante horizontale magnétique N-S. Lui sont associés un photomètre auroral et un récepteur TBF.

Un fluxmètre identique a été installé à Borok (district de Iaroslav, U. R. S. S.) en janvier 1964. Il mesure la même composante NS. Lui sont aussi associés un photomètre et un récepteur TBF. L'ensemble de l'équipement a été déplacé à Sogra (district de Kotlas, U. R. S. S.), plus proche du point conjugué magnétique théorique de Port-aux-Français, en juin 1964.

Les observations se poursuivent et sont analysées en collaboration franco-soviétique. De premiers résultats ont été publiés soulignant notamment la relation d'antiphase qui existe aux hautes latitudes entre les trains d'oscillations hydromagnétiques en deux points conjugués.

Une voie EW sera installée en janvier 1965 à Port-aux-Français, et une autre au début de 1965 à Sogra. Une station d'observation provisoire à même latitude, mais décalée en longitude, sera installée pour quelques mois en Suède en 1965.

2. — Sondages ionosphériques verticaux (A.I.S.C. nouveau) : F. du Castel.

L'étude des perturbations itinérantes de l'ionosphère par sondages ionosphériques verticaux rapides entre points conjugués

à moyenne latitude (Europe-Afrique du Sud, V.7(*a*)4) a conduit à envisager une nouvelle expérience à latitude plus élevée. Sous réserve de l'accord soviétique, l'expérience aurait lieu à Port-aux-Français (1 sondeur vertical) et la région conjuguée de Sogra (3 sondeurs verticaux distants de 100 à 200 km) à la fin de 1965.

L'objectif de l'expérience serait, en complétant les données actuelles sur la dynamique de ces perturbations et leur corrélation entre zones conjuguées, de permettre de progresser dans l'interprétation des irrégularités d'ionisation alignées sur le champ magnétique terrestre, et en particulier de trancher entre une origine de ces irrégularitités due à un apport particulaire et une origine due aux systèmes de courants ionosphériques.

8. — Etude de l'ionosphère par diffusion électronique incohérente (C.N.E.S.) : M. Petit.

9. — Mesure de la densité électronique par fusées dans la basse ionosphère (C.N.E.S.) : *a*) O. Storey ; *b*) A. Spizzichino.

10. — Etude par satellite Franco-Americain des irrégularités d'ionisation exosphérique (C.N.E.S.) : O. Storey.

11. — Etude de l'anomalie ionosphérique équatoriale (A.I.S.C. et Labo) : F. du Castel

L'étude de la structure et de l'évolution de l'anomalie ionosphérique équatoriale en Afrique, par sondages ionosphériques aéroportés, se fera par deux séries de vols en 1965. Le premier aura lieu au voisinage du solstice en janvier 1965, le second au voisinage de l'équinoxe en avril 1965. Les vols se dérouleront entre les régions de Niamey (Niger), où est installé provisoirement un sondeur vertical de référence, et de Cotonou (Dahomey) (cf. réf. 1 et 2).

Cette étude sera complétée en février 1965 par une série de vols à latitude plus élevée, effectuée en Europe occidentale, lors de passages du satellite Alouette observés à Winkfield (R. U.). L'objet de cette étude complémentaire est l'observation simultanée, dans l'ionosphère inférieure et supérieure, des perturbations associées à des irrégularités d'ionisation alignées sur le champ magnétique et l'étude de l'origine de ces perturbations (cf. V.7(*a*)4, V.7(*b*)2).

German Democratic Republic

The Space Research Group of the O.I.F. (Observatory for Ionospheric Research) in Kühlungsborn has joined the S 66 programme (Faraday-fading, differential Doppler) and is analysing the total electron content of the ionosphere for comparison with I.G.Y. results (Dr. SCHMELOVSKY). There is close cooperation with the N(h) profile programme (Dr. TAUBENHEIM) of the H.H.I. (Heinrich Hertz Institute) and also with stations in neighbouring countries. By comparison of simultaneous A1, A2 and A3 absorption measurements, a separation of the contributions of different ionospheric regions to radio wave absorption in medium latitudes is attempted by the H.H.I. (W. Lippert). A considerable influence of the F region on cosmic noise absorption is to be expected. A special analysis of I.Q.S.Y. A3 absorption measurements on low and medium frequencies up to great sun heights is planned at the O.I.F. (Prof. Dr. Lauter). From comparisons with earlier measurements, it may be concluded that the absorption during the first year of I.Q.S.Y. was lower than during sunspot minimum 1954 at these frequencies. There is now a special network for low-frequency (steep incidence) propagation in operation between the German Democratic Republic, Czechoslovakia and Bulgaria for a study of the changes in high-energy particle flux in middle latitudes over the sunspot cycle.

Another study programme of the O.I.F. is the winter behaviour of the plasma in the mesopause region as deduced from A3 results and from LF and VLF phase-height analysis. A research group of the Meteorological Service of the German Democratic Republic (Dr. Bohme) will assist us in this programme from the point of view of results of balloon launchings into the middle stratosphere. This programme will be further supplemented by fully analysed synchronous drift mesurements at low frequencies at the O.I.F. (Dr. Sprenger) and at the Collm Observatory (Dr. Schminder).

As announced, an atmospheric-noise study programme has been set up by the O.I.F. Kühlungsborn on the ship « Altmark » which sailed from the Baltic Sea, through the Mediterranean and Arabian Oceans to East Africa down to Lat. 07°S and the same route back (May to August 1964). The programme involved measurements of daily variations of integrated noise level (27-100 kc/s), frequency dependence of noise level between 10 kc/s to 1 Mc/s during day

and night, probability distributions of noise envelopes and magnetic tape records : 1-20 kc/s.

A network with uniformly calibrated measurements of integrated noise level on 27 kc/s is made up of stations in Sweden, German Democratic Republic, Czechoslovakia and Bulgaria.

Federal Republic of Germany

1. — Contributions to ionospheric research are carried out at the following places :

(*a*) (LI) Max-Planck-Institute for Aeronomy, Institute for Ionospheric Physics, Lindau/Harz.

(*b*) (TU) Ionospheric station Tsumeb, South West Africa. This station is operated by (*a*).

(*c*) (SO) Geophysical Observatory Sodankylä, Northern Finland in cooperation between (*a*) and the Finnish Academy of Science.

(*b*) (BR) Ionospheric Institute, Breisach/Rhein.

(*e*) (DA) Deutsche Bundespost, Fernmeldetechnisches Zentralamt, F. Gr. 5 *c*, Darmstadt.

(*f*) (TO) Ionospheric Station Dapango in Northern Togo, Central Africa. This station is operated by (*d*).

(*g*) (BE) Heinrich-Hertz-Institut für Schwingunsforschung, West Berlin.

(*h*) (CO) Institute for Geophysics and Meteorology of the University of Cologne.

(*i*) (RS) By LI on board the research ship « Meteor » around the crossing point of geographic and geomagnetic dip equator in the Atlantic Ocean during the second half of 1965. For particulars see *I.Q.S.Y. Notes*, No. 13.

2. — The following observations are planned in detail (the places of observation are given by the abbreviations under V.1.).

2.1. — *Vertical Soundings.*

Vertical incidence sweep frequency soundings (1-16 Mc/s) at 15 min. intervals and during R.W.D. and S.W.I. at 3 or 5 min. intervals at LI, TU, RS, BR, DA, and TO.

Vertical incidence sweep frequency soundings (0.35-5.6 Mc/s) according to a special programme at TU.

Direct recording of ionospheric characteristics, e. g. MUF 3000, h_{min}, fEs, etc. at BR, DA, and TO.

2.2. — *Oblique Incidence HF-Propagation and Backscatter.*

Oblique incidence sweep frequency two-way pulse transmissions (4-45 Mc/s) between LI and TU, LI and SO, and SO and TU.

Sweep frequency backscatter observations (4-45 Mc/s) at LI to different directions and at TU in the direction of the equator.

Fixed frequency backscatter observations to different directions at DA.

Field-strength recordings in the HF range on long-distance paths, including transequatorial paths, at DA.

2.3. — *Ionospheric Drift Measurements.*

According to the fading method at BR, CO and TO ; according to the meteor method at BR.

2.4. — *Absorption Measurements.*

Absorption measurements with vertical incidence pulse transmissions (A1) on different fixed frequencies at noon, all day during R.W.D. and S.W.I., at LI and BR. At TU in the range 0.35-1.6 Mc/s.

Absorption measurements with vertical incidence pulse transmission on 2.2 Mc/s by observing only one pulse selected by a gate (A1) at TU.

Absorption measurements by means of riometers on a fixed frequency (A2) at LI, TU and SO.

Absorption measurements by field-strength recordings of HF-transmitters about 300-400 km away (A3) at LI, DA, and TU.

2.5. — *VLF Observations.*

VLF recordings (amplitude and phase variations) of a transmitter over a transpolar path at LI, DA, and SO (as a contribution to polar cap absorption research).

VLF recordings (amplitude and phase variations) and sferics recordings at BE (as a contribution to VLF propagation research).

2.6. — *Rockets and Satellites.*

Observations of satellites with the Faraday rotation and Doppler method to compute the electron distribution above the F2-layer maximum at LI, BR, and SO.

Rocket measurements of electron density and solar ultraviolet radiation in the ionosphere by BR.

(More details are given in the Section on Aeronomy and Space Research).

3. — Cooperation with the Republic of Togo.

An ionospheric station is established at DAPANGO in the Republic of Togo (10°48'N, 000°4'E) by agreement between this Republic and the Federal Republic of Germany, P.T.T. administration. The Republic of Togo, although not formally participating in the I.Q.S.Y., has cooperated in the provision of facilities for a station operated by the I.Q.S.Y. Committee of the Federal Republic of Germany. The main aim of the station is the study of the magnetic declination effect on the F2 layer by comparison with Zaria (Nigeria) and Djibouti (French Somaliland). Ionospheric drifts will be observed by method D1 on the same frequencies as at Ibadan (Nigeria) which is on the opposite side of the magnetic (dip) equator.

Greece

Ionospheric Institute, National Observatory of Athens and special Research Groups (sponsored by U.S.A.F. Cambridge Research Center and N.A.T.O. Scientific Affairs Division).

Work scheduled :

Sinoptic observations : Vertical incidence sounding (continuous, 1 Mc/s to 20 Mc/s peak power 50 kW). Absorption by riometer (on 6 different frequencies and pulse technique). Ionospheric drifts. Whistlers and VLF on 27.6 kc/s. Oblique incidence — 50 kW peak power panoramic sounder logarithmic receivers collaborating with Breisach and later with Boston, in sweep frequency. Oblique incidence on fixed frequencies (Breisach-Athens) on 11 and 13 Mc/s.

Special projects : Cross modulation to determine electron profiles. Sporadic E (special project measurements by five special receivers spaced in locations 200 km around Athens).

Remarks : The study of ionospheric drifts and of oblique incidence on fixed frequencies (Breisach-Athens) on 11 and 13 Mc/s has been cancelled. The cross-modulation measurements have been replaced by back-scatter measurements. All vertical sounding ionograms are now being taken every minute on 16 mm film. All the rest of the observations mentioned above are being carried out regularly.

India

1. — Most of the programmes are in operation according to schedule. The programme on meteor-echo studies has been deleted.

2. — The Trivandrum manual recorder has been replaced by a C-4 ionosonde ; the ionosonde has been installed at the Equatorial Rocket Launching site at Thumba.

3. — With the launching of the S-66 international satellite, Faraday fading observations began at four Indian stations : Delhi (N.P.L.), Ahmedabad (P.R.L.), Hydrabad (D.E.R.L.) and Kodaikanal. The very convenient geographical distribution of the stations (geomagnetic latitudes 24.8°N to 1.75°N along about the same meridian) offers results of considerable scientific value.

Iraq

The operation of the ionospheric station at Baghdad commenced late in the I.Q.S.Y. programme. Actual recording of $h'f$ profiles on paper film began on 23rd February 1965. The antenna system for the sounder is a horizontal folded dipole type for all the frequency bands.

The present activity is confined to vertical sounding, made at hourly intervals, with frequency sweeps between 0.7 Mc/s and 24.0 Mc/s. During World and Special Days, recording is made quarter-hourly. Ranges of mid-day critical frequencies so far observed are given below :

foE : 3.2-3.4 Mc/s
foF1 : 4.3-4.6 Mc/s
foF2 : 6.4-8.4 Mc/s.

Plans are being made for the reduction of the sounding data for the eventual distribution to the W.D.Cs, but this is not expected to be in full swing before September 1965.

The station is intended to remain operating after the I.Q.S.Y. period.

Ireland

Sudden ionospheric disturbances (S.I.D.) are being recorded at Dunsink observatory, which is acting as W.D.C. for records of these phenomena.

Italy

1. — General.

The purpose of this programme is to intensify the study of the influence of the solar cycle on the ionosphere ; such studies were started during the I.G.Y. and it is now important to continue the observations during this minimum period of the solar cycle.

2. — Italian Observation Programme.

Ionospheric observations in Italy will be made at the following observatories and scientific bodies :

S. Alessio Observatory of the I.N.G. (Istituto Nazionale di Geofisica, Roma).

M. Capellino Observatory of the I.G.G. (Istituto Geofisico e Geodetico, Genova).

Riometer station of the I.E.T. (Istituto di Elettronica e Telecomunicazioni, Torino).

Riometer station of the C.M.F. (Centro Microonde, Firenze).

Torrechiaruccia station of the C.R.G.M. (Centro Radioelettrico « Guglielmo Marconi »).

2.1. — *Istituto Nazionale di Geofisica — I.N.G.*

The ionospheric sounding station of S. Alessio (Roma), of the I.N.G., has continued routine measurements every 30 minutes. The station is equipped with MK II sounders of the Union Radio having a sweep from 0.6 to 25 Mc/s. The results, deduced from *f*-plot diagrams, are tabulated in a monthly bulletin and distributed. A second sounding station is planned by the I.N.G. to be established at Gibilmanna (Sicily) in 1965.

2.2. — *Istituto Geofisico e Geodetico — I.G.G.*

The ionospheric soundings station of Monte Capellino (Genova) of the I.G.G. dell'Università di Genova, has continued regular vertical soundings for the determination of the characteristics and absorption of the ionosphere.

2.3. — *Istituto di Elettronica e Telecomunicazioni — I.E.T.*

The riometer of the I.E.T. (Politecnico di Torino) is being mounted. The apparatus, Mark II Mod. 100-G, of the Aerospace Research Inc., has plug-in units for 20 and 30 Mc/s and 5 % frequency sweeping for minimum detection on an Esterline Angus recorder. A special feature of the station is in the antennas,

which are horizontal double half-wave dipole arrays with binomial current distribution (i. e. corresponding to the terms of a binomial series) which theoretically avoids occurrence of side-lobes. A distribution of 1-3-3-1 has been successfully realized on the model and is being considered at present for the real size antennas. The beam width at the -3*d*B points is 31° in the vertical plane containing the array, and 53° in the orthogonal plane. The possibility of obtaining an equal beam width in both planes, by using collinear dipoles with a binomial distribution 1-2-1, is being considered. The antenna is pointed at the zenith. Due to the high level of man-made noise around Torino, the station is located 50 km away to the North near Ivrea, at 45°27′E. It is expected that this station will come into operation before the summer of 1965.

2.4. — *Centro Microonde — C.M.F.*

A riometer station is working on a frequency of 27.6 Mc/s near Firenze (43°48′N, 11°13′E), care of the C.M.F., and uses a riometer lent by the Norwegian Defence Establishment with a Yagi three-element antenna having a lobe of 110° × 60° at —3*d*B.

2.5. — *Centro Radioelettrico* « G. *Marconi* » — *C.R.G.M.*

Backscatter observations are carried out at the station of Torrechiaruccia (Roma) of the C.R.G.M. Recording of back-scatter echo-noise will be carried out every half hour in the range 18.6 Mc/s or 14.2 Mc/s between 0800 and 1800 UT.

2.6. — A riometer station on a frequency of 18 Mc/s has been planned by the Astronomical Observatory of Roma.

U.R.S.I.-C.I.G.

N(*h*) Sub-Committee

Calculation of Electron Density/Height Profiles in the Ionosphere

(From *I.Q.S.Y. Notes*, No. 14, September 1965)

During the past ten or fifteen years, a great many different methods have been developed for the calculation of N(*h*) profiles in the ionosphere using, as basic data, the well-known *h*′(*f*) curves (iono-

grams) which are obtained at regular intervals in many parts of the world by means of ionosondes.

The complexity of the calculations is such that the most accurate N(h) profiles can be obtained only from very high quality ionograms and with the help of electronic computers. However, there has always been a need for simpler manual methods for obtaining approximate N(h) profiles quickly and without too much laborious computation. Many such methods are available and it was intended to review the relative merits of the different manual methods and to publish full details of a recommended method in an *I.Q.S.Y. Instruction Manual.* Further examination showed that it would not be possible to recommend any one method for use in all circumstances. The choice of the most appropriate method depends on the requirements of the research project in hand and, in particular, on which of the parameters of the profile are most important in this research.

In 1964, the N(h) Profiles Sub-Committee of the U.R.S.I.-C.I.G. Committee met in London under the Chairmanship of Mr. J. W. Wright of C.R.P.L., and made a critical examination of the different computer and manual methods of calculating N(h) profiles and the results of their work will be published in « Radio Science ». The publication will include an account of the simple polynomial method, developed by Dr. Titheridge, which is mentioned in the Report of the Ionosphere Working Group which met in Madrid in March 1965 (*I.Q.S.Y. Notes*, No. 13, p. 25). The decision not to publish this method in an *I.Q.S.Y. Instruction Manual* was based on the considerations mentioned above and was not intended to deprecate the use of this method which, like others, has many advantages when used in appropriate circumstances.

A full Report of the Sub-Committee meting has been prepared by Mr. J. W. Wright and has appeared in the *U.R.S.I. Bulletin*, No. 151.

I.C.S U.

I.C.S.U. Bulletin

Third Meeting of the I.C.S.U. Executive Committee

I.C.S.U. Bulletin, No. 4, July 1965, has been issued. It contains *inter alia* a brief report on the third meeting of the I.C.S.U. Executive Committee, Munich, 5-7 April, 1965. This report has been prepared from the Official minutes of which excerpts have been published in *U.R.S.I. Information Bulletin*, No. 151. The points included in the report published in *I.C.S.U. Bulletin*, No. 4 are principally those on which the I.C.S.U. Executive Committee made recommendations.

Here under excerpts from this brief report :

COMITÉ INTERNATIONAL DE GÉOPHYSIQUE AND INTERNATIONAL YEARS OF THE QUIET SUN.

Prof. W. J. G. Beynon, President of C.I.G. and I.Q.S.Y., presented reports on the work of the two Committees. He suggested to the Executive Committee that : (*a*) for the present C.I.G. remain in being and that in the next year or so a plan be prepared for a revised long-term C.I.G. : (*b*) this plan be drafted by the present C.I.G. Bureau and W.D.C. representatives acting in consultation with I.C.S.U. and other interested bodies : (*c*) I.C.S.U. allow the present Officers of C.I.G. to continue as an interim body to prepare proposals for a new constitution for C.I.G. The Executive Committee resolved that C.I.G. continue only until the end of 1967 and that the incumbent President and Vice-Presidents be asked to continue in office until 1967 in order to assist and advise I.C.S.U. on the preparation of a new constitution for the Committee.

INTER-UNION COMMISSION ON SOLAR TERRESTRIAL RELATIONS AND INTER-UNION COMMISSION ON THE IONOSPHERE.

The Committee discussed at length the increasing importance of Solar Terrestrial Physics and in particular the activities of the

I.U.C.S.T.R., its terms of reference and membership. The Executive Committee resolved that the I.U.C.S.T.R. be urged to make appropriate additions to its membership and modifications of its rules, so as to provide representation for all interested Unions, Commissions and Committees of I.C.S.U. and that the Unions, Commissions and Committees concerned, be urged to coordinate the arranging of Symposia through this Commission. The Executive Committee felt also that the I.U.C.S.T.R. could satisfactorily cover the work of the Inter-Union Commission on the Ionosphere, and agreed that after consultation with the Chairman of the I.U.C.I., the possibility of the dissolution of this Commission should be considered by the interested unions.

Inter-Union Commission on the Allocation of Frequencies (I.U.C.A.F.).

The report of I.U.C.A.F. was presented by Dr. R. L. Smith-Rose. He said that in an endeavour to obtain appropriate recognition for radio astronomy and better protection of frequencies, I.U.C.A.F. has issued a document encouraging radio astronomers to indicate to their own national bodies their needs for new frequencies and to give the relevant facts on the current situation.

Federation of Astronomical and Geophysical Services.

Prof. G. D. Garland presented the report of F.A.G.S. He said that the Federation required a further allocation of $ 3800 from I.C.S.U. to enable it to cover the expenses of a new service called SPARMO, which deals with the launching of balloons to study the atmosphere. In view of the fact that the number of the services within the Federation had increased, but that the income had decreased, the Executive Committee agreed to give serious consideration to the application by F.A.G.S. for an additional grant in 1965.

Working Group on the Free Circulation of Scientists.

Prof. H. Brown said that the main problem of the Working Group since its inception, had been attendance at international meetings of scientists from the German Democratic Republic. This question had been resolved to a large extent by a new ruling concerning the delivery of Visas and Travel Documents. A point which was causing some concern, however, was the almost com-

plete lack of contact with scientists on the mainland of China. It was agreed that the best way of tackling this problem was through individual contacts with scientists, and that the Academies should be asked to stress in their correspondence with Academia Sinica in Pekin, the importance of free circulation of scientists.

WORKING GROUP ON RELATIONS WITH DEVELOPING COUNTRIES.

Prof. M. Florkin presented the report of the Working Group. A suggestion was made that scientists from the developed countries should be encouraged to undertake missions in the developing countries and scientists from developing countries should be assisted to enable them to attend international meetings. The Executive Committee felt that the Working Group should be enlarged, and decided that the President of I.C.S.U. should convene a meeting in the Autumn of 1965 to deal with the subject of relations with developing countries, and with the enlargement of the present working group.

WORKING GROUP ON FUTURE STRUCTURE.

The President presented the report which was unanimously adopted. The Executive Committee decided that :

(1) there should be no changes in the main objectives of I.C.S.U. ;
(2) new Scientific Unions should be admitted to membership of I.C.S.U. only where there is no possibility for an I.C.S.U. Member Union to accommodate the new discipline by modification of its own structure ;
(3) a National Member should not normally be considered as ready for full membership, unless it can fulfil the obligations imposed by full membership and has a national body, representing the country's scientific activities, which has been in existence for six years ;
(4) each Union should have a Representative on the Executive Committee, and one additional National Representative should be elected to the Executive Committee for every two additional Union Representatives ;
(5) an interval of two years should be maintained between General Assemblies ;
(6) the President should be eligible for re-election for a second term of two years, and the Secretary-General and Treasurer should be eligible for not more than three successive terms of office ;

(7) a Standing Committee for the consideration of admissions should be set up, consisting of the President and eight other members, not necessarily Members of the Executive Committee ;
(8) I.C.S.U. should normally bear the expenses of meetings of Special and Scientific Committees only during the formative stages of such Committees ;
(9) greater publicity should be given in I.C.S.U. publications to actions taken in the general interests of the world community, and the feasibility of an identity card for *bona fide* scientists engaged on I.C.S.U. business should be explored.

The acceptance of this report involves changes in the Statutes. A new draft will be submitted to the Executive Committee and then to the General Assembly in January 1966.

APPLICATIONS FOR ADMISSION.

(1) *Scientific Members.*

The representatives of the International Union of Nutritional Sciences (I.U.N.S.), the International Organization of Pure and Applied Biophysics (I.O.P.A.B.), the Section of Pharmacology of the International Union of Physiological Sciences (S.E.P.H.A.R.), spoke on behalf of their respective bodies. The Executive Committee agreed to recommend to the General Assembly at Bombay the admission of the International Organization for Pure and Applied Biophysics, and to communicate to the General Assembly the result of the vote on the admission of the I.U.B.S. The Committee decided, however, not to recommend to the General Assembly the admission of the Section of Pharmacology.

(2) *National Members.*

The Executive Committee recommended to the XI General Assembly the admission of the Principality of Monaco as a National Member.

I.U.G.G. COMMITTEE ON ATMOSPHERIC SCIENCES.

The Chairman of this Committee emphasized certain points contained in the Committee's report. The Committee explicitly proposed that close collaboration be established between S.C.O.R. and I.C.S.U., and that the Committee should continue its work and meet again in the Spring of 1965 in collaboration with W.M.O. The

Executive Committee formally approved the plan put forward by the Committee on Atmospheric Sciences and expressed the hope that further steps would be taken to provide help from I.C.S.U., W.M.O. and perhaps U.N.E.S.C.O.

Resolution from the International Astronomical Union.

Prof. Pecker read a resolution to the effect that :

« The Executive Committee of the International Astronomical Union noting that several of its adhering organizations have expressed opposition to any increase in their contributions to the Union, and that the activities of the Union will have to be severely curtailed if its income cannot be increased, formally requested the International Council of Scientific Unions to use its unique influence to urge its national members to increase their support, both financially and in other ways, to the scientific members of the I.C.S.U., namely the International Scientific Unions. »

The President said that I.C.S.U. was trying to get more funds and was also considering asking National Members to change their categories. The Executive Committee gave its assurance that I.C.S.U. would do all it could to help the Unions.

C.O.S.P.A.R.

Resolutions adopted at the Eighth Plenary Meeting

Working Group I on Tracking, Telemetry and Dynamics

RESOLUTION 2 : *Frequency Allocations for Space Research.*

C.O.S.P.A.R.

noting with satisfaction the improvements in frequency allocations to space research effected by the final acts of the Extraordinary Administrative Radio Conference in Geneva, 1963, but

considering

(i) the expected extension of tracking and telemetry facilities in the near future, especially for deep space probes in all regions and for Earth satellites in Region 1 and 3,

(ii) the importance of recovering a high proportion of the telemetred data at all times, and of all data at certain critical times, and

(iii) the limitation in the steps which can be, and are being, taken by system designers to reduce the effects of interference,

recommends that I.U.C.A.F. take all possible steps to ensure that the protection now accorded in the bands 2290-2300 Mc/s and 1700-1710 Mc/s in Region 2. be extended to Region 1 and 3, the case for the former band being considered the more urgent.

RESOLUTION 3 : *Notification of Cases of Interference.*

C.O.S.P.A.R.,

recognizing the importance of achieving effective protection against harmful interference for those using the allocated radio frequency bands for space research purposes, and

noting the advice given by the Secretary General of I.U.C.A.F. (1),

(1) Radio Frequency for Space Research by R. L. Smith-Rose — Report of I.U.C.A.F. Representative to C.O.S.P..AR., Buenos Aires, 1965.

urges all national space science committees to ensure, through their national administration (see Resolution 6, Florence, 1964), that :

(i) All space research earth stations and Space stations be registered with the International Frequency Registration Board of the I.T.U.

(ii) Reports of harmful interference be brought to the notice of the appropriate national administration so that it may take action towards securing elimination of this interference.

Working Group III on Data and Publications

RESOLUTION 8 : *Spacecraft categorization for SPACEWARN.*

C.O.S.P.A.R.,

Concurring in the recommendation of the International Ursigram and World Days Service that the effectiveness of international distributions of satellite and space probe information via the SPACEWARN System may be improved if for these purposes spacecraft are indentified in categories according to the urgency and details of information needed by the scientific community,

suggests the following categories :

I. — Spacecraft particularly suited for broad international participation ;

II. — Spacecraft of unusual interest ; and

III. — all others,

recommends that launching authorities include these categories in their launching announcements and

requests I.U.W.D.S. to develop on behalf of C.O.S.P.A.R. suitable methods of handling information in the different categories.

RESOLUTION 9 : *SPACEWARN Distribution.*

C.O.S.P.A.R.,

notes with appreciation the response of the International Ursigram and World Days Service to earlier C.O.S.P.A.R. resolution providing for distribution by mail of a confirmed list of satellite designations and of satellites with continuous radio transmissions, and

suggests that I.U.W.D.S. uses the same method for widespread distribution of other non urgent information now carried in SPACEWARN telegrams.

Ninth Plenary Meeting

(May 10 to 19, 1966)

and

Seventh International Space Science Symposium

(May 11 to 17, 1966)
in Vienna (Austria)

I. — General Description

The 1966 Vienna Symposium will comprise several parts as follows :

(i) Parts devoted to special topics in the Physical Sciences (R),
Topic R.1. — *Moon and Planets*, sponsored jointly by I.A.U. and C.O.S.P.A.R., *Convenor* and *Chairman* : Prof. L. Gratton.
Topic R.2. — *Interactions between the neutral part and the ionized part of the Athmosphere*, sponsored jointly by I.U.G.G., U.R.S.I. and C.O.S.P.A.R., *Convenor* and *Chairman* : Prof. S. A. Bowhill.

(ii) Part devoted to Life Sciences and Space Research (L), sponsored jointly by I.U.B., I.U.B.S., I.U.P.S. and C.O.S.P.A.R., *Chairman* : Prof. M. Florkin.

(iii) Part devoted to Latest Significant Results (S), *Chairman* : Dr. H. Friedman.

For L and S the Sessions will be organized under the aegis of Working Groups I, II, IV, V and VI.

The letters R, L and S are the symbols for each part and will be used for identification.

Addresses of the Convenors and Chairmen are given in an attached appendix.

The parts jointly sponsored by U.R.S.I. are detailed hereafter in sections III and V.

II. — General Organization

II.1. — *Classification of the papers.*

Papers presented at the Symposium will fall into the following categories :

(*a*) *Invited Review Paper.* — Such a paper should describe the

state of scientific knowledge in a defined field. Thus it is not restricted to results obtained recently or only by space vehicles.

The paper must be able to be presented in less than one hour and it is desirable that its written text be within an upper limit of 20 typewritten pages, including illustrations.

The Scientist who agrees to prepare and present such a paper will be formally invited by the Convenor of the part of the Symposium concerned.

In some cases (R.2 for example) the Review paper of a session is replaced by an introduction by the Discussion Leader. This introduction obeys the same rules but is shorter than a review paper and serves more as a heading to the invited contributed papers than as a full exposé with conclusions.

(*b*) *Invited Contributed Paper.* — This follows the same rules inasmuch as the author is invited, but with some restrictions : It must be complementary to the Review paper which it follows, It must be able to be presented in less than half an hour, and the length of the written text must be within a limit of 10 typewritten pages, including illustrations.

(*c*) *Contributed Paper.* — This category of paper will be presented in the L and S sessions only and will be submitted on the initiative of each individual scientist.

The requirements for such a paper are as follows :

1. It should deal with results obtained by means of satellites, space probes, sounding rockets or high altitude balloons,
2. These results must be recent and significant.
3. The paper must be short and should not contain mathematical developments unless absolutely necessary. The length of the written text should not exceed a maximum of 8/10 pages including illustrations and references. The author must prepare the oral presentation in order to stress all important points in less than 20 minutes.

II.2. — *Procedure — before the Symposium.*

(*a*) *Abstracts* of all papers should reach the addresses below before the 1st of March 1966 :

One copy to the C.O.S.P.A.R. Secretariat ;

One copy to the Chairman of the Programme Committee concerned, for R.1 and R.2 ;

One copy to each of the Chairmen of the Working Groups concerned, for L and S.

In accordance with the procedure followed previously in several countries, Scientists should submit their abstracts *through their National Space Committee in time to meet the dead-line mentioned above* (1st of March 1966).

(*b*) The Programme Committees will inform the C.O.S.P.A.R. Secretariat of their decisions before the 15th of March.

They can do so by correspondence, in the case of R.1, R.2 and L. A meeting of the Programme Committee for S will take place in the C.O.S.P.A.R. Headquarters before the 10th of March.

(*c*) The Secretariat will try to issue the programme booklet two weeks before the Symposium in order to send it to those responsible for the various topics and sessions.

II.3. — *Procedure — during the Symposium.*

(*a*) The Scientists chosen by the Programme Committees will give three copies of their full paper to the Secretariat.

Each paper must be preceded by an abstract, particularly when it is not the same as the one published in the programme booklet.

The two languages accepted are English and French.

The author must indicate whether or not he wishes to have his paper published in the C.O.S.P.A.R. Proceedings. In the first case the author is committed not to publish his paper elsewhere ; in the second case the author should indicate where he intends to publish it in full.

(*b*) C.O.S.P.A.R. will in due course designate reporters for each session and an Editorial Committee. The reporters will have to give their opinion on the papers presented to the Editorial Committee. Detailed instructions will be given in Vienna.

(*c*) Concerning the slides it would be appreciated if in general the number of slides could be limited to a maximum of about six in the case of an ordinary paper.

Authors are urged to use slides in preference to epidiascope material and to test these slides in advance for legibility under average conditions of lantern projection. For example, a table with more than ten lines is seldom readable from the back of a lecture hall, nor are letters or numbers which are smaller than 3 % of the slide dimensions. Opaque illustrations will not be

acceptable. Authors are therefore encouraged to design slides especially for the oral presentation of their contribution rather than to use direct reproductions of the illustrations designed for their printed paper.

(*d*) *Important recommendation.* — The experience of the past years up until 1965 has been somewhat unsatisfactory concerning the delay in publication of the C.O.S.P.A.R. Symposium Proceedings. The main reason is that sometimes only about one third of the papers left with the Secretariat were in a form ready for publication. The time spent in obtaining such a form for all the other papers was considerably detrimental to the promptness of the general publication.

C.O.S.P.A.R. apologizes for having to remind authors of some requirements, which are listed hereafter.

1. The paper distributed at the Symposium should be in its final version. Of course discussions may lead the author to make some alteration and in that case the final version in a form ready for publication and in three copies must reach the Secretariat before the end of June 1966. These three copies must be identical.
2. The typewriting of the text must be clear and the formulae carefully drawn. Special attention must be given to Greek letters or special symbols in the text as well as in the formulae.
3. Photographs should be in the form either of very good glossy prints or of good negatives. Illustrations which are extracted from a journal or a book are not suitable.

Diagrams should be reproduced either on white paper with lines thick enough to be legible if they need to be reduced or on tracing paper with the above mentioned condition.

The above recommendations 3 and 4 must be respected for at least one of the three copies, which will be used by the publisher.

In addition to the above three copies for the Secretariat, authors are kindly requested to arrange to bring about 100 preprints of their paper to Vienna.

III. — Special Topics (Symbol R)

III.2. — Interactions between Neutral Part and Ionized Part of the Atmosphere — R.2 —

jointly sponsored by I.U.G.G., U.R.S.I. and C.O.S.P.A.R.

The purpose of this part of the Symposium will be twofold :

(i) to inform theoretical aeronomists of recent puzzling results obtained by space experimenters,

(ii) to stimulate suggestions for critical experiments which may assist in the planning of future space experiments.

The topics tentatively decided upon for this part are the following :

R.2.1. — Neutral atmosphere and apparent lower ionosphere motions ; emphasizing comparison of rocket and ground-based experiments.

R.2.2. — Wind shears and the sporadic E-layer : recent rocket results and their interpretation.

R.2.3. — Photochemistry and transport of minor mesospheric constituents.

R.2.4. — Stratosphere-ionosphere coupling effects and turbopause changes ; with special reference to the planning of rocket experiments.

R.2 being of interest to all countries which launch sounding rockets, even small, it is expected that authors from these countries will be able to contribute fruitfully to this part.

Abstracts of invited and contributed papers will be sent by the authors, through their National Space Committee, one copy to the C.O.S.P.A.R. secretariat and one copy to Prof. S. A. Bowhill, *Department of Electrical Engineering, University of Illinois, Urbana, Ill., U. S. A.*

V. — Latest Significant Results (Symbol S)

V.1. — Readers are reminded that, as a modification of past procedure, all the S sessions will be arranged as open meetings of Working Groups I, II, IV and VI and will cover a maximum of six half-day sessions. The details of the sessions will be fixed by the S Programme Committee at its meeting in March 1966 and will be made known in Vienna.

Participants should know that these sessions will take place from Wednesday 11 May afternoon to Saturday 14 May at noon.

V.2. — Concerning the problems of Solar Terrestrial relationships the attention of scientists wishing to present papers on such matters is called to the fact that an Inter-Union Symposium on Solar Terrestrial Physics will be held in Belgrade in the summer of 1966.

The main topics selected for this Symposium are :

Topic 1. — Solar Particle Emissions and Interplanetary Magnetic Fields ;

Topic 2. — The Interaction of Solar Plasma with the Geomagnetic Field :
I. : Quiet Conditions ;

Topic 3. — The Interaction of Solar Plasma with the Geomagnetic Field :
II. : Disturbed Conditions ;

Topic 4. — Energetic Charged Particles in the Magnetosphere ;

Topic 5. — The Temperature of Neutral and Charged Particles in the Ionosphere and the Magnetosphere.

In agreement with the Programme Committee of the Inter-Union Symposium, scientists who have new data dealing directly with these topics are encouraged by C.O.S.P.A.R. to present them in Belgrade rather than in Vienna.

V.3. — *Abstracts of proposed contributed papers will be sent by the authors, through their National Space Committee, one copy to the C.O.S.P.A.R. Secretariat and two copies to each of the W. G. chairmen concerned. Each abstract must indicate to which working group (or working groups) it is intended to refer.*

VI. — C.O.S.P.A.R. Meeting and Meetings of C.O.S.P.A.R. Working Groups

VI.1. — Ninth Plenary Meeting of C.O.S.P.A.R.

As usual, the first session of the C.O.S.P.A.R. Plenary Meeting will consist of the presentation of reports of National Institutions, Scientific Unions and Committees.

This session wil' take place on Tuesday, 10 May, taking the whole day.

Authors of reports are warned that the time allocated to each presentation will be extremely short, normally of the order of 5 *minutes.* Thus the oral presentation must stress only the most important facts and intentions, the full written report being distributed before the opening of the session. In order to make this distribution possible, authors are kindly requested to bring with them or to send to the C.O.S.P.A.R. Secretariat in Vienna, before the opening session, a sufficient number of copies.

The final session of the Ninth Plenary Meeting on Thursday

19 afternoon will be a business meeting open only to Members of C.O.S.P.A.R. and invited observers.

VI.2. — Meetings of C.O.S.P.A.R. Working Groups.

Meetings of C.O.S.P.A.R. Working Groups are an occasion for exchanging information on multilateral cooperative programmes in space research, for expressing or forming collective opinions about space research and for suggesting or carrying out appropriate cooperative studies. Consequently the Working Groups play a prominent part in the activities of C.O.S.P.A.R.

Members of C.O.S.P.A.R. Working Groups are reminded of the importance of attending the meetings of their Groups.

VI.3. — Scope of the Working Groups.

VI.3.1. Working Group I. — Tracking, Telemetry and Dynamics of Satellites.

This title is self explanatory.

VI.3.2. Working Group II. — Design and coordination of Experiments.

For the time being it deals chiefly with the Physics of the solar system :

Aeronomy and Aurora.
Ionosphere.
Meteorology.
Geomagnetism and Cosmic Rays.
Solar activity and Interplanetary Medium.

It now comprises the following panels :

Conjugate points.
Polar Cap Experiments.
Real Time Telemetry.
Dynamics and Structure of Neutral Atmosphere.
Interactions of the Neutral and Ionized Atmosphere.
Dynamics of the Geomagnetic Trap.
Solar Flares.

VI.3.3. — Working Group IV — Properties of the Upper Atmosphere :

The task of the Group is to follow the progress in Upper Atmosphere Physics resulting from rocket and satellite research.

Conventionally the Upper Atmosphere has been divided into three altitude regions :

From 304 to 100 km ;

From 100 to 200 km ;
Above 200 km.

The envisaged properties are : density, pressure, scale height, mean molecular weight, temperature and composition.

VI.3.4. — Working Group V — Space Biology.

It deals with two main subjects :

Terrestrial Life in Space.
Extraterrestrial Life.

V.I.3.5. — Working Group VI — Scientific Space Experiments concerned with Properties and Dynamics of the Troposphere and Stratosphere.

The terms of reference of this new Working Group are :

(1) to further international understanding of, and cooperation in, the use of rocket and satellite systems and techniques for meteorological research ;
(2) to promote international discussions involving meteorologists with scientists of other disciplines in order to provide a good climate for the development of imaginative new approaches to the use of rockets and satellites for meteorological research.

VII. — Participation

Scientists from all countries whether or not they are Members of C.O.S.P.A.R. are welcome to attend any part of the Symposium and to submit papers for consideration by the Programme Committee concerned.

Financial Assistance.

It is expected that limited funds will be available to assist scientists who will actively participate in the meeting and who cannot otherwise find sufficient support to pay travel expenses to attend the Symposium.

If such assistance is absolutely required, application should be sent as early as possible to the C.O.S.P.A.R. Secretariat through *the scientist's National Space Committee*, stating clearly an estimate of the amount needed and the amount of expected support from institution(s) of his own country.

All applications should reach the C.O.S.P.A.R. Secretariat *before* 1 *March* 1966.

VIII. — Further Information

A second circular will be issued as soon as more detailed information on the arrangements of the Symposium become available.

C.O.S.P.A.R. Secretariat

Executive Secretary : Mr. M. J. Gazin.

Postal address : C.O.S.P.A.R. Secretariat, 55, boulevard Malesherbes, Paris (8), France.
Telegrams : COSPACERES, Paris.
Telephone : 522-19.93.

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

(Vienna, 10-19 May 1966)

Provisional Time Schedule

Day	a. m.	p. m.
Mon. 9	10.00 Registration	14.30 Registration 17.00 Preliminary session of Bureau
Tues. 10	8.30 Registration (cont'd) 9.30 Open session of Plenary Meeting of C.O.S.P.A.R. — Reports	14.30 Plenary Meeting (cont'd) 18.30 Preliminary Session of Executive Council
Wed. 11	9.00 Business sessions of W.G.	15.00 Open sessions of W.G., sessions (S) and (L)
Thur. 12	9.00 Open sessions of W.G. Sessions (S) and (L)	15.00 Cont'd
Fri. 13	9.00 Cont'd	Cont'd
Sat. 14	9.00 Cont'd	Business meeting of W.G. and drafting of Resolutions by W.G.
Sun. 15		

Provisional Time Schedule (continued)

Mon. 16	9.00 Session (R1) – Moon and Planets Session (R2) — Interactions	15.00 (R1) Cont'd (R2)
Tue. 17	9.00 (R1) (R2) Cont'd	15.00 Cont'd
Wed. 18	9.00 Cont'd	15.00 (R1) (R2) Cont'd 15.00 Informal Bureau meeting with Advisers 18.30 Regular Bureau meeting
Thur. 19	9.30 Meeting of the Executive Council	14.30 Plenary Meeting of C.O.S.P.A.R.

Note. — Meetings of the Programme Committee with Chairmen and Reporters will take place on Wednesday 11 May or 10 May at night. Meetings of the Editorial Committee and of the Drafting Committee will be announced in Vienna.

Information Bulletin

C.O.S.P.A.R. Information Bulletin, No. 24, July 1965, has been issued.

Besides a brief report on the Eighth C.O.S.P.A.R. Meeting and Sixth International Space Science Symposium, the issue contains :

1. The proceedings of the following meetings :

Conference on satellite tracking, Riga, February, 1965.

Symposium sur les trajectoires des corps célestes artificiels déterminées d'après les observations, Paris, avril 1965.

Conférence sur les satellites, Cracovie, avril 1965.

2. A calendar of meetings of interest to C.O.S.P.A.R.

3. Some papers connected to C.O.S.P.A.R. activities, among those we may mention the following of interest to U.R.S.I. fields :

International interchange of rocket and satellite data, by H. Odishaw.

SPACEWARN — An international mechanism for rapid distribution of information on satellites and space probes, by A. H. Shapley.

INTERNATIONAL UNION OF GEODESY AND GEOPHYSICS

Publications

INTERNATIONAL ASSOCIATION OF GEOMAGNETISM AND AERONOMY

I.A.G.A. Bulletins, Nos. 1202, 12 pl.

Geomagnetic Data 1960 Rapid: Variations (*I.A.G.A. Bulletin*, No. 1202)

Geomagnetic Data 1961: Indices K and C (*I.A.G.A. Bulletin*, No. 12 pl.)

by J. BARTELS, A. ROMAÑA and J. VELDKAMP

The International Association of Geomagnetism and Aeronomy continues to publish annual quantitative descriptions of the time changes of the intensity of geomagnetic activity and data have now been published for the 30 years 1932-1961. The tables of data constitute a series of several million figures supplied by geomagnetic observatories, and collected by the I.A.G.A. Committee on Characterization of Magnetic Disturbances. Since 1954, this work has been undertaken by the Permanent Service of Geomagnetic Indices in the I.C.S.U. Federation of Astronomical and Geophysical Services.

I.A.G.A. Bulletin, No. 1202 gives an account of the Geomagnetic Rapid Variations which occurred during 1960. It contains the following data :

A list of observatories with their geographic and geomagnetic co-ordinates.

A list of sudden commencements followed by a magnetic storm, or by an increase in activity lasting at least one hour (ssc).

A list of commencements of bays or pulsational disturbances associated with bays.

A summary of pulsational disturbances (*pt* and *pg*) not associated with bays.
A summary of sudden magnetic changes or impulsations (si) which cannot be classified as *ssc*, *b*, *bp*, etc.
A list of minor disturbances reported by less than 10 observatories.
A summary of solar flare effects.
A summary of doubtful solar flare effects.

This Bulletin consist of 64 pages and is on sale at a price of $ 2,60, 20/-, F. F. 13 (postage included).

I.A.G.A. Bulletin, No. 12 pl deals with geomagnetic indices. Regional conditions are described by the daily character-figures C and the three-hour-range index K, scale 0 to 9. The eight K-indices per day are combined into world-wide averages, the international character figure Ci, and the geomagnetic planetary three-hour-range indices, Kp. After a trial period of several years, the K-index was adopted together with the principle of the Kp-index, as measures of geomagnetic activity. A daily measure based on Kp, the average amplitude Ap, has tentatively been introduced. The volume contains :

A list of observatories with geographic and geomagnetic coordinates.
The eight K-indices for each day of 1961.
C-figures for 100 observatories for each day of the year 1961.
The international geomagnetic character-figure Ci, 1961.
Selected quiet and disturbed days for 1961.
The mean international character-figures Ci by months and by years, for the years 1900-1961.
A table summarizing the K-indices for 1961 giving the usual Kp-Table, supplemented by « equivalent ranges », to express « magnetic activity » in some linear scale, in addition to the quasi-logarithmic scale of the indices K and Kp.
Frequencies of Kp-indices for each month 1961.
The average of Ap and Cp for months and year 1961.
A list of magnetic storms 1961.
A list of very quiet intervals in 1961.
The 27-day-recurrence diagram for 1961 represents the Kp-values in a « musical » notescript. The arrangement of the Kp in lines of 27 days helps to make evident any possible recurrence-tendency.

This Bulletin contains 106 pages and is on sale at the price of $ 2,60, 20/-, F. F. 13 (postage included).

I.A.G.A. Bulletin, No. 18

Collection of Geomagnetic Planetary Indices Kp and Derived Daily Indices, Ap and Cp for the years 1932 to 1961

by Julius BARTELS

With the completion of thirthy years series of three-hour-range planetary indices Kp, the late Prof. J. Bartels decided to reprint the tables and documents in a single volume. The series for 1932-1961 comprises 87664 Kp indices as well as 10958 Ap indices. They are based on nearly a million K indices.

The introduction defines Kp, Ap and Cp. There is also a list of references and an explanation of the graphical representation of the Kp indices in rows of 27 days, now known as musical diagrams, in order to facilitate recognition of 27-day recurrences tendencies.

I.A.G.A. Bulletin, No. 18, consists of 188 pages and costs $ 4,00, 30/-, or F. F. 20 (postage included).

I.A.G.A. Symposium, No. 2

Symposium d'Aéronomie Berkeley, Août 1963

I.A.G.A. organises at each I.U.G.G. General Assembly a Symposium on Aeronomy and the Proceedings of those held in 1954 (*I.A.G.A., Bull.*, No. 15*b*), 1957 (*I.A.G.A. Bul.*, No. 16*b*), and 1960 (*I.A.G.A.* Symposium, No. 1) have been published. The papers presented at the Symposium on Aeronomy held during the course of the XIII General Assembly, Berkeley 1963, have now been published as I.A.G.A. Symposium, No. 2, having originally been printed in *Annales de Géophysique*, Tome 20, fasc. 1 and 2, 1964.

The President of I.A.G.A., Professor M. Nicolet, states in his Preface to this report :

« Generally, all important aspects are adequately covered at each symposium which provide a guide for observational and theoretical activities in aeronomy. But the present exploration on the environment of the earth and planets by rockets and satellites requires a better knowledge of experimental facts which can be

obtained from laboratory measurements. On the other hand, the best of the scientific literature on laboratory data is not immediately available for aeronomic purposes. Consequently, the Symposium was devoted to the experimental work related to aeronomic processes. In the field of aeronomy, sufficient time has elapsed to discuss the need for a great deal of careful experimental work. These discussions will provide a guide for those who will perform the difficult laboratory measurements which .will make substantial contributions to aeronomy ».

The papers printed in this book are :

M. A. Biondi : Electron-ion and ion-ion recombination.

J. F. Paulson : Low energy charge exchange and ion-molecule reactions.

W. L. Fite : Charge transfer and ion-atom interchange collisions above thermal energies.

L. M. Branscomb : A review of photo-detachment and related negative ion processes relevant to aeronomy.

A. Dalgarno : Corpuscular radiation in the upper atmosphere.

F. Kaufman : Aeronomic processes involving hydrogen : a review of recent laboratory studies.

H. I. Schiff : Reactions involving nitrogen and oxygen.

R. W. Nicholls : Transition probabilities of aeronomically important spectra.

C. A. Barth : Three-body reactions.

I.A.G.A. Symposium, No. 2 contains 152 pages and costs $ 5,30, 40/-, or F. F. 26,50.

Orders should be sent to : I.U.G.G. Publications Office, 136 *bis*, rue de Grenelle, Paris 7e.

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As from January, 1965, all the stocks of I.A.G.A. publications have been transferred to the I.U.G.G. Publications Office, 136*bis*, rue de Grenelle, Paris 7e, France. There are now no other authorised Agents for the sale of the bulletins, etc., listed in this leaflet.

Please send in the quantities indicated.

Number of copies			
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.....	Rome Meeting, 1922 (*Bull.*, No. 3)	$ 2,60, 20/–, F. Frcs 13,00	.....
.....	Madrid Meeting, 1924 (*Bull.*, No. 5)	$ 2,60, 20/–, F. Frcs 13,00	.....
.....	Stockholm Meeting, 1930 (*Bull.*, No. 8)	$ 4,85, 37/–, F. Frcs 24,00	.....
.....	Lisbonne Meeting, 1933 (*Bull.*, No. 9)	$ 3,70, 28/–, F. Frcs 18,00	.....
.....	Edinburgh Meeting, 1936 (*Bull.*, No. 10)	$ 4,60, 35/–, F. Frcs 23,00	.....
.....	Washington Meeting, 1939 (*Bull.*, No. 11)	$ 4,60, 35/–, F. Frcs 23,00	.....
.....	Oslo Meeting, 1948 (*Bull.*, No. 13)	$ 4,60, 35/–, F. Frcs 23,00	.....
.....	Brussels Meeting, 1951 (*Bull.*, No. 14)	$ 4,60, 35/–, F. Frcs 23,00	.....
.....	Rome Meeting, 1954 (*Bull.*, No. 15)	$ 4,60, 35/–, F. Frcs 23,00	.....
.....	Toronto Meeting, 1957 (*Bull.*, No. 16)	$ 5,30, 40/–, F. Frcs 26,50	.....
	Geomagnetic Indices and Geomagnetic Data		
.....	Geomagnetic Indices K and C, August 1932-33, International Polar Year (*Bull.*, No. 12*d*)	$ 2,00, 15/–, F. Frcs 10,00	.....
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Geomagnetic Indices K and C, 1956 (*Bull.*, No. 12*k*)	$ 2,95, 22/6, F. Frcs 14,75	
Geomagnetic Data, 1957, Indices K and C, Rapid Variations (*Bull.*, No. 12*l*)	$ 4,00, 30/–, F. Frcs 20,00	
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Geomagnetic Data, 1961, Indices K and C (*Bull.*, No. 12*p*1)	$ 2,60, 20/–, F. Frcs 13,00	
Geomagnetic Planetary Indices Kp, Ap and Cp, 1932-1961 (*Bull.*, No. 18)	$ 4,00, 30/–, F. Frcs 20,00	

I.A.G.A. Symposia

Symposium sur le Noyau Terrestre, Rome, 1954 (*Bull.*,No.15*a*)	$ 1,30, 10/–, F. Frcs 6,50	
Symposium sur les Problèmes de la Physique de la Haute Atmosphère, Rome, 1954 (*Bull.*, No. 15*b*)	$ 5,30, 40/-, F. Frcs 26,50	
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Symposium sur l'Aéronomie, Toronto, 1957 (*Bull.*, No. 16*b*)	$ 5,30, 40/–, F. Frcs 26,50	
Symposium on Rapid Magnetic Variations, Utrecht, 1959 (*Bull.*, No. 16*c*)	$ 4,00, 30/–, F. Frcs 20,00	
I.A.G.A. Symposium No. 1, Copenhagen, 1960	$ 8,00, 60/–, F. Frcs 40,00	
I.A.G.A. Symposium No. 2, Berkeley, 1963	$ 5,30, 40/–, F. Frcs 26,50	
	TOTAL	

INTERNATIONAL UNION OF PURE AND APPLIED ~~PHYSICS~~ CHEMISTRY

Composition of the New Bureau

The Council in Paris elected some new members and Officers of the Bureau. For the period 1965-1967 the I.U.P.A.C. Bureau is as follows :

BUREAU

President : Prof. W. KLEMM (Germany).
Past President : Lord TODD (U. K.).
Vice-President : Prof. V. N. KONDRATIEV (U. S. S. R.).
Secretary General : Dr. R. MORF (Switzerland).
Treasurer : Prof. J. C. BAILAR Jr. (U. S. A.).

Members :

Prof. V. DEULOFEU (Argentina) ;
Dr. C. O. GABRIELSON (Sweden) ;
Prof. D. GINSBURG (Israel) ;
Dr. T. R. GOVINDACHARI (India) ;
Prof. J. LECOMTE (France) ;
Prof. H. MALISSA (Austria) ;
Prof. L. MARION (Canada) ;
Prof. S. I. MIZUSHIMA (Japan) ;
Dr. A. L. G. REES (Australia) ;
Prof. H. W. THOMPSON (U. K.) ;
Prof. P. E. VERKADE (Netherlands) ;
Prof. O. WICHTERLE (Czechoslovakia).

C.C.I.R.

Réunions Intérimaires des Commissions d'Etudes

MONTE-CARLO, MARS 1965

Le C.C.I.R. a publié des volumes contenant les conclusions adoptées par les Commissions d'Etudes au cours des réunions intérimaires qu'elles ont tenues à Monte-Carlo, en mars 1965.

Ces publications, distribuées à tous les participants aux travaux des diverses Commissions, doivent être considérées comme faisant partie de la documentation préparatoire destinée aux réunions des Commissions qui doivent avoir lieu au moment de la XI[e] Assemblée Plénière du C.C.I.R.

Il convient de signaler que les propositions contenues dans les brochures et qui ont trait à des textes nouveaux ou modifiés n'ont pas encore été approuvées officiellement par une Assemblée plénière, elles ne constituent donc pas pour le moment, des conclusions officielles du C.C.I.R.

Les conclusions qui ont été publiées pour le moment sont celles des Commissions d'Etudes citées ci-après :

Commission d'Etudes IV. — Systèmes utilisés dans les télécommunications spatiales et radioastronomie (2 parties).
Commission d'Etudes VII. — Fréquences étalon et signaux horaires.

Interim Meetings of Study Groups

MONTE-CARLO, MARCH, 1965

The C.C.I.R. has issued volumes containing the conclusions of interim meetings of C.C.I.R. Study Groups, held in March 1965 in Monte-Carlo.

The volumes, which are being distributed to all participants in the work of the various study Groups, are to be considered as part of the preparatory documentation for the meetings of the

Study Groups scheduled to be held at the time of the XIth Plenary Assembly.

It should be pointed out that, as the proposals for new or modified text contained in the volumes have not yet been formally approved by a Plenary Assembly, they are not yet official C.C.I.R. conclusions.

The conclusions which have already been published are those of the following Study Groups :

Study Group IV. — Space Systems and Radioastronomy (2 parts).
Study Group VII. — Standard-frequencies and Time-Signals.

U.N.E.S.C.O.

Sciences exactes et naturelles

Le Directeur Général de l'U.N.E.S.C.O. a annoncé la nomination du Professeur Gerd Burkhardt (République Fédérale Allemande) au poste de Directeur du Département de l'avancement des sciences. Le Professeur Burkhardt entrera en fonction le 15 septembre 1965.

Le Département de l'avancement des sciences et le Département de l'application des sciences au développement, dirigé par le Dr. Ralph A. Krause (Etats Unis d'Amérique), sont placés sous l'autorité du Professeur Alexey M. Matveyev (U. R. S. S.), sous-directeur général pour les sciences.

(*Chronique de l'U.N.E.S.C.O.*).

BIBLIOGRAPHIE

Union Internationale des Télécommunications

Liste internationale des fréquences, 3e édition 1965

Nous informons nos lecteurs que l'U.I.T., a publié : 1° *la 3e édition de la Liste internationale des fréquences.* Elle a été établie dans la forme prévue à l'Appendice 9 au Règlement des radiocommunications (Genève, 1959).

La 3e édition de la Liste internationale des fréquences comprend les états signalétiques des assignations de fréquence inscrites dans le Fichier de référence international des fréquences à la date du 1er février 1965. Elle est tenue à jour au moyen de suppléments récapitulatifs trimestriels.

Ce document comprend une préface et quatre volumes. La Préface a été publiée séparément en langues française, anglaise et espagnole. Le volume IV a été édité en quatre fascicules distincts qui peuvent être livrés séparément. Les titres et en-têtes des colonnes des Volumes I à IV figurent en langues française, anglaise, espagnole, russe et chinoise.

Le prix de vente a été fixé comme il suit :

	Francs suisses
Préface aux quatre volumes, en langues française, anglaise ou espagnole	11,—
Volume I. — Assignations de fréquence dans les bandes comprises entre 10 et 4995 kHz	80,—
Volume II. — Assignations de fréquence dans les bandes comprises entre 4995 et 9995 kHz	90,—
Volume III. — Assignations de fréquence dans les bandes comprises entre 9995 et 28.000 kHz	80,—
Volume IV, Partie A. — Assignations de fréquence dans les bandes comprises entre 28 et 50 MHz, à l'exclusion des stations de radiodiffusion	11,—
Volume IV, Partie B. — Assignations de fréquence de la Région 1 dans les bandes comprises entre 50 et 40.000 MHz, et assignations de fréquence aux stations de radiodiffusion de la Région 1 dans les bandes comprises entre 28 et 50 MHz	30,—
Volume IV, Partie C. — Assignations de fréquence de la Région 2 dans les bandes comprises entre 50 et 40.000 MHz	22.—
Volume IV, Partie D. — Assignations de fréquence de la Région 3 dans les bandes comprises entre 50 et 40.000 MHz, et assignations de fréquence aux stations de radiodiffusion de la Région 3 dans les bandes comprises entre 28 et 50 MHz	12,—

2° *La 3e édition de la Nomenclature des stations de radiodiffusion fonctionnant dans les bandes au-dessous de* 5950 *kHz.*

Cette Nomenclature comprend les stations de radiodiffusion fonctionnant dans les bandes au-dessous de 5950 kHz dont les assignations de fréquence figurent dans la Liste internationale des fréquences, autre document publié par l'U.I.T. Elles sont publiées dans la forme prévue à l'Appendice 9 au Règlement des radiocommunications de Genève (1959).

Ce document trilingue (français, anglais, espagnol) d'environ 180 pages sera tenu à jour par des suppléments récapitulatifs semestriels. Chaque volume est accompagné d'Observations et Explications qui figurent en français, en anglais et en espagnol.

Le prix de vente de cette publication a été fixé à 15 francs suisses.

* * *

Les prix mentionnés comprennent les frais de port pour envoi par la poste ordinaire dans le monde entier, l'emballage et l'abonnement aux suppléments qui paraîtront jusqu'aux prochaines éditions.

Les commandes peuvent être envoyées à la Section des Ventes de l'Union Internationale des Télécommunications, Place des Nations, 1211, Genève 20, Suisse.

BIBLIOGRAPHY

International Telecommunication Union

International Frequency List, 3rd edition, 1965

We are informing our readers that the I.T.U. has published 1. the *3rd edition of the International Frequency List*, in the form specified in Appendix 9 to the Radio Regulations (Geneva, 1959).

The 3rd edition of the International Frequency List gives particulars of the frequency assignments entered in the Master International Frequency Register as on 1 February 1965 and is kept up to date by quarterly recapitulatory supplements.

The List comprises a preface and four volumes. The Preface has been published separately in English, French and Spanish. Volume IV consists of four sections which can be purchased separately. The titles and column headings in Volumes I to IV appear in English, French, Spanish, Russian and Chinese.

The sale price of this document is as follows :

	Swiss francs
Preface to the four volumes, in English, French or Spanish	11.—
Volume I. — Frequency assignments in the bands between 10 and 4995 kc/s	80.—
Volume II. — Frequency assignments in the bands between 4995 and 9995 kc/s	90.—
Volume III. — Frequency assignments in the bands between 9995 and 28.000 kc/s	80.—
Volume IV, Part A. — Frequency assignments in the bands between 28 and 50 Mc/s, excluding broadcasting stations	11.—
Volume IV, Part B. — Frequency assignments in Region 1 in the bands between 50 and 40.000 Mc/s, and assignments to broadcasting stations in Region 1 in the bands between 28 and 50 Mc/s	30.—
Volume IV, Part C. — Frequency assignments in Region 2 in the bands between 50 and 40.000 Mc/s.....	22.—
Volume IV, Part D. — Frequency assignments in Region 3 in the bands between 50 and 40.000 Mc/s, and assignments to broadcasting stations in Region 3 in the bands between 28 and 50 Mc/s	12.—

2. The third edition of the *List of Broadcasting Stations operating in bands below 5950 kc/s.*

The List includes the broadcasting stations working in the bands below 5950 kc/s and having their frequency assignments in the International

Frequency List, another document published by the I.T.U. They appear in the form prescribed in Appendix 9 to the Radio Regulations (Geneva, 1959).

This three-language document (in English, Spanish, and French) of some 180 pages will be kept up to date by recapitulatory supplements every six months. In each volume Remarks and Explanations appear in French, English and Spanish.

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The prices mentioned include postage costs by ordinary mail throughout the world, as well as the cost of all supplements issued prior to the next editions.

Orders should be sent to the Sales Sections of the International Telecommunication Union, Place des Nations, 1121, Geneva 20, Switzerland.