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URSI

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OBITUARY

Dr. van der Toorn

We have the sad duty to inform our readers that Dr. van der Toorn suddenly passed away on November 3rd, 1966. Dr. van der Toorn was for long years connected with the activities of the Netherlands National Committee for URSI and of the IUCAF to which he contributed most valuable advice resulting from his long experience in the field of radio and telecommunications.

On behalf of URSI we express to Mrs van der Toorn our very sincere sympathies.

URSI NEWS

L. V. Berkner Honored for his Leadership in US Space Programme

All those who are aware of the numerous activities of our Honorary President, Dr. L. V. Berkner, will be interested in the following quotation from the October issue of « News Report » of the National Academy of Sciences, USA.

Lloyd V. Berkner was presented with the National Aeronautics and Space Administration's Distinguished Public Service Medal October 7 for his pioneering work in the advancement of space science.

Dr. Berkner is now chairman of the board of trustees, Graduate Research Center of the Southwest, and is former chairman of the NAS Space Science Board. He also serves as treasurer of the Academy.

NASA Administrator James E. Webb presented the award to Dr. Berkner with the following citation :

« For outstanding and pioneering leadership in organizing and serving for four years as the Chairman of the Space Science Board of the National Academy of Sciences; for his wise counsel and vigorous efforts to bring government, universities, and industry into a new pattern of effective relationships to better serve the nation in the formative early years of the US national effort in space research; for his vision in bringing our first non-military space project, Vanguard, into being; for his many contributions to both our national and international space programs and for his leadership in the development of new concepts and practices of graduate and post-doctoral education in space, earth, and life science research ».

Dr. Berkner delivered the principal address at the awards ceremonies, in which he praised the space program for its « outstanding successes and remarkable safety », but pointed to the urgent need for setting future national goals in space.

It is a pleasant duty for URSI Board to present Dr. L. V. Berkner our warmest congratulations for that award and to take this opportunity to thank him for his devotion to URSI.

XV^e ASSEMBLÉE GÉNÉRALE

Résolutions et recommandations

COMMISSION III. — IONOSPHERE

RECOMMANDATION III.1. — *Réseau d'observations ionosphériques.*

L'URSI,

notant que la Commission III a examiné le Vœu (Doc. VI/1001, Oslo 1966) du CCIR sur les Sondages réguliers de l'ionosphère, ainsi que le Programme d'Etudes (Doc. VI/1016, Oslo 1966) du CCIR sur l'Amélioration du programme mondial d'observations ionosphériques pour la cartographie numérique,

recommande :

1) que le Secrétaire général communique au CCIR l'accord général de l'URSI sur le Vœu et le Programme d'Etudes du CCIR, ainsi que les commentaires explicatifs figurant à l'Annexe;
2) que la Commission inter-Unions de physique solaire-terrestre du CIUS effectue les études et prenne éventuellement les dispositions nécessaires pour la création d'un Service international solaire-terrestre qui serait chargé, notamment, de fournir les directives scientifiques nécessaires pour les réseaux d'observations ionosphériques; que, en attendant la création de ce Service, le Comité de l'URSI pour la physique solaire-terrestre continue de grouper les membres consultatifs appropriés, et que ces recommandations soient portées à la connaissance du CCIR et des Comités Nationaux de l'URSI.

Annexe

1. Relativement au point 1 du Vœu (Doc. VI/1001, Oslo 1966) du CCIR :

a) L'URSI considère l'ionosonde comme un outil important du point de vue scientifique et estime dès lors que les mesures

effectuées par le réseau existant peuvent contribuer sérieusement à l'amélioration continue des connaissances scientifiques sur l'ionosphère; elle note en outre que des groupes scientifiques nombreux utilisent les résultats des stations effectuant des sondages réguliers pour leurs recherches sur l'atmosphère supérieure, y compris les études de l'ionosphère par le haut.

b) L'URSI approuve et appuie le fait que les Centres mondiaux de données soient le mécanisme qui permet de rendre accessibles à la communauté des scientifiques et techniciens intéressés les résultats des observations systématiques de l'ionosphère.

2. Relativement au point de vue 2 du Vœu (Doc. VI/1001, Oslo 1966) et au point 1 du Programme d'Etudes (Doc. VI/1016, Oslo 1966) du CCIR :

a) L'URSI accueille avec satisfaction l'étude requise par la Question 313 (VI) du CCIR, portant sur la distribution optimale des stations d'observation pour les prévisions ionosphériques à long terme et les études synoptiques à court terme.

b) L'URSI organisera, sous les auspices de son Comité pour la physique solaire-terrestre, une étude complémentaire tendant à déterminer la meilleure répartition à donner aux stations qui effectuent des sondages systématiques à la verticale et en oblique pour des fins scientifiques, et émettra, si possible, son appréciation sur les besoins du CCIR dans ce domaine, y compris la cartographie ionosphérique; les résultats de cette étude seront communiqués en temps opportun au CCIR.

3. Relativement au point 4 du Vœu (Doc. VI/1001, Oslo 1966) du CCIR :

a) L'URSI attire l'attention des groupes s'occupant activement du dépouillement des données des sondages par le haut sur le Vœu du CCIR, et les invite à continuer de communiquer leurs résultats aux Centres mondiaux de données, si possible sous une forme appropriée au problème de la prévision ionosphérique.

4. Relativement au point 2 du Programme d'Etudes (Doc. VI/1016, Oslo 1966) du CCIR :

a) L'URSI souhaite que l'étude citée en 2. *b*) ci-dessus englobe un examen de ce Programme d'Etudes du CCIR, ainsi que des

commentaires quant à la possibilité d'appliquer aux travaux de cartographie numérique de l'ionosphère les résultats des sondages réguliers sous incidence oblique et par le haut.

RECOMMANDATION III.2. — *Observations pour les indices ionosphérique et solaire.*

L'URSI,

notant que sa Commission III approuve le Vœu (Doc. VI/1019, Oslo 1966) du CCIR,

recommande instamment :

1) que les neuf stations d'observation ionosphérique suivantes, établies de longue date, poursuivent leurs activités en vue de l'établissement de l'indice I_{F2} :

Canberra	Delhi	Slough
Churchill	Godley Head	Tokyo
College	Huancayo	Washington

tout en estimant que d'éventuels légers changements d'emplacement, par exemple ne dépassant pas 50 km aux latitudes moyennes, ne pourraient invalider les résultats utilisés pour l'établissement de l'indice I_{F2};

2) que le National Research Council, Ottawa, Canada, poursuive indéfiniment ses mesures du flux de bruit radioélectrique solaire sur 10,7 cm, étant donné que celles-ci représentent la seule base pour l'établissement d'un indice solaire valable pour toutes les disciplines scientifiques et techniques intéressées;

3) que le Secrétaire général de l'URSI communique le texte de la présente recommandation au CCIR et aux organismes intéressés, ainsi qu'à leurs Comités Nationaux de l'URSI.

RECOMMANDATION III.3. — *Propagation par guidage au-dessus du maximum d'ionisation de la région F.*

L'URSI,

considérant que le CCIR a préparé un rapport scientifique provisoire à ce sujet (Doc. VI/1036, Oslo 1966) et adopté une Question (Doc. VI/1025, Oslo 1966) qui a été renvoyée à la Commission III de l'URSI,

recommande que, pour préparer la réponse de l'URSI à cette Question, le Comité de l'URSI pour la physique solaire-terrestre forme un petit groupe de travail permanent dont le mandat est donné dans l'Annexe à la présente recommandation.

Annexe

Le mandat ci-dessous est suggéré pour le Groupe de travail sur le Guidage au-dessus du maximum d'ionisation :

a) examiner la Question 316/VI du CCIR relative à la propagation par guidage au-dessus du maximum d'ionisation de la région F, réviser et mettre à jour le contenu scientifique du Rapport (Doc. VI/1036, Oslo 1966) et inciter et encourager la poursuite des travaux dans le domaine des problèmes soulevés;

b) étudier toutes autres questions relatives à l'ionosphère supérieure qui pourraient être renvoyées au Groupe de travail par la Commission III, le Comité pour la physique solaire-terrestre ou le Comité exécutif de l'URSI;

c) faire rapport au Comité de l'URSI pour la physique solaire-terrestre, au cours de la réunion des AISC à Londres en 1967, et ultérieurement si nécessaire, de manière à pouvoir présenter en temps opportun au CCIR les rapports appropriés, aux fins d'examens par la Commission d'Etudes VI du CCIR;

d) présenter à la Commission III, à titre d'information, au cours de la XVI[e] Assemblée générale, un rapport de mise au point sur cette question. Il est suggéré que le Groupe de travail comprenne : M. W. R. Piggott (président), M. du Castel (secrétaire) et le D[r] Chapman, et qu'il se mette en contact avec tous les chercheurs actifs dans ce domaine.

RECOMMANDATION III.4. — *Nature physique des couches E sporadiques.*

L'URSI,

considérant que le CCIR a soumis à l'URSI (Commission III) le Programme d'Etudes (Doc. VI/1033, Oslo 1966) sur la prévision des couches E sporadiques,

recommande :

1) que les commentaires formulés dans l'Annexe soient diffusés, dans l'espoir qu'ils attireront une attention accrue sur le pro-

blème de la base physique et de la prévision des couches E sporadiques;

2) que le Dr Whitehead soit invité à établir, en se fondant sur la littérature scientifique et technique, de brefs rapports de synthèse sur la nature physique des couches E sporadiques, ainsi que sur toutes applications possibles au problème de la prévision;

3) que l'Annexe et les rapports cités en (1) et (2) soient communiqués au CCIR comme contributions de l'URSI, en temps opportun pour les réunions de la Commission d'Etudes VI.

Annexe

a) L'URSI a patronné avec le COSPAR un colloque scientifique (Vienne, mai 1966) consacré aux cisaillements de vents dans la région E et à d'autres sujets essentiels pour la meilleure compréhension des mécanismes physiques donnant lieu à des couches E sporadiques (1);

b) D'autres réunions scientifiques consacrées aux problèmes de l'ionisation sporadique de la région E ont été organisées récemment, notamment la conférence d'Estes Park (Etats-Unis) en 1965 récemment publiée (2), de même que la parution sous forme de livre d'un recueil d'articles détaillés (3), et d'autres activités de ce genre sont projetées;

c) Le mécanisme (ou les mécanismes) physique(s) à l'origine des couches E sporadiques constituent un sujet courant qui soulève un intérêt considérable dans les milieux scientifiques; l'importance pratique de ce sujet pour les télécommunications doit stimuler les chercheurs à concentrer leur attention sur cet aspect de la physique ionosphérique et de l'aéronomie;

d) Le système de prévision des couches E sporadiques, requis par le CCIR, est le développement important et logique des études scientifiques fondamentales et d'ailleurs le degré d'efficacité de tout système de prévision réside dans la vérification finale de la compréhension des mécanismes physiques donnant naissance aux couches E sporadiques.

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(1) Space Research, Vol. VII (sous presse).

(2) Bowhill, ed., *Radio Science*, 1, n° 2, Fév. 1966.

(3) Matsushita and Smith : *Ionospheric Sporadic E* (Pergamon Press 1962).

RECOMMANDATION III.5. — *Répartition et emplacement des stations de sondage ionosphérique.*

L'URSI,

considérant que, dans sa Question 313 (VI) (Doc. VI/1015, Oslo 1966), le CCIR demande que soit étudiée la question de savoir quels sont les programmes mondiaux d'observations ionosphériques les plus favorables pour les prévisions à long terme et les études synoptiques à court terme,

recommande que le Comité de l'URSI pour la physique solaire-terrestre effectue une étude complémentaire en vue de déterminer la répartition et l'emplacement des stations de sondage ionosphérique sous incidence verticale et sous incidence oblique, les plus favorables aux études scientifiques. Le mandat figure à l'Annexe de la présente recommandation.

Annexe

Il est suggéré d'ajouter les points suivants au mandat du Groupe de travail chargé de cette étude :

a) Tenir compte des besoins qui se manifestent dans les études scientifiques aussi bien du point de vue des données de sondage proprement dites, que du point de vue des données de sondage exploitées en conjonction avec les données d'expériences à partir du sol et d'expériences spatiales.

b) Des commentaires substantiels seront également fournis, si possible, au sujet du Vœu (Doc. VI/1001, Oslo 1966) et du Programme d'Etudes (Doc. VI/1016, Oslo 1966) du CCIR.

c) Des rapports provisoires seront fournis pour juillet 1967, et ultérieurement, en temps opportun pour les réunions de la Commission d'Etudes VI du CCIR.

d) Un rapport de mise au point sera communiqué, pour information, à la Commission III de l'URSI au cours de la XVI^{e} Assemblée générale.

e) Il est suggéré de confier à M. W. R. Piggott, membre consultatif pour les sondages verticaux, la présidence de ce groupe qui comprendrait les représentants des principaux organismes scientifiques faisant usage des données de sondages, et de solliciter les avis des chercheurs intéressés travaillant dans les domaines des études radioélectriques, de la géophysique et des recherches spatiales.

RECOMMANDATION III.6. — *Ionosphère de référence.*

L'URSI,

considérant que le COSPAR et certains autres organismes ont manifesté quelque intérêt pour un projet de compilation d'une ionosphère de référence, analogue à la compilation publiée par le COSPAR sous le titre « Atmosphères de référence »,

recommande :

1) que le Comité de l'URSI pour la physique solaire-terrestre établisse un Groupe de travail pour juger de la nécessité de définir une ionosphère de référence ainsi que des possibilités de cette compilation à partir des connaissances actuelles, le Groupe de travail ayant le mandat figurant dans l'annexe, et
2) que, sur la base de cette étude et en consultation avec le COSPAR, le Comité de l'URSI pour la physique solaire-terrestre décide de l'opportunité d'entreprendre ce projet en association avec le COSPAR.

Annexe

Mandat et suggestions :

a) Prendre en considération l'avis de la Commission III de l'URSI, selon lequel une ionosphère de référence serait utile à plusieurs titres, mais que, à défaut d'une compilation détaillée tenant compte, aux altitudes de la région F par exemple, des variations diurnes, géographiques, géomagnétiques, saisonnières, selon le cycle solaire et autres, elle pourrait être interprétée de façon erronée par les chercheurs n'étant pas parfaitement au courant de ces questions très complexes.

b) Prendre en considération l'avis de la Commission III de l'URSI, selon lequel cette compilation représenterait un projet d'intérêt majeur, qui devrait tenir compte de la profusion de données de sondages à partir du sol, s'ajoutant aux données provenant d'expériences spatiales, ainsi que des autres compilations internationales telles que celles produites par le CCIR.

c) Il est prévu que le Groupe de travail prenne contact à ce sujet avec les Groupes de travail II et IV du COSPAR, ainsi qu'avec le Président du Groupe de travail international VI/3 du CCIR.

d) Il est suggéré que le Groupe de travail comprenne MM. Bowhill, J. W. King, J. W. Wright, Carpenter, Chapman et Evans,

que M. Bowhill réunisse ce Groupe et sollicite la participation, par correspondance, de tous les chercheurs intéressés.

e) Le Groupe de travail est également invité à présenter pour information à la Commission III un rapport de mise au point au cours de la XVI[e] Assemblée générale.

RECOMMANDATION III.7. — *Groupe de travail sur le dépouillement des données sur les vents ionosphériques.*

L'URSI,

notant qu'il est nécessaire que les spécialistes en la matière poursuivent la discussion sur le dépouillement des données sur les vents obtenues au moyen des différentes méthodes (D1 à D4),

recommande que le Comité de l'URSI pour la physique solaire-terrestre constitue un petit Groupe de travail permanent, avec mission d'étudier les problèmes de l'analyse et de l'interprétation, y compris les points mentionnés dans l'Annexe, et de formuler des recommandations à ce sujet.

Annexe

Mandat du Groupe de travail sur les vents :

a) Etudier de manière approfondie les différentes méthodes d'analyse des données, pour la méthode D1 en particulier, de façon à pouvoir donner aux stations des conseils sur l'efficacité relative de ces méthodes. Ce faisant, il conviendra de tenir compte de l'emplacement de la station et de ses disponibilités.

b) Comparer l'utilité des méthodes D1, D2, D3 et D4, et établir les besoins ainsi que les méthodes les meilleures de dépouillement et de présentation des données pour permettre la comparaison des résultats.

c) Examiner la question de la sélection et du rejet des données, pour être à même de formuler des conseils, lorsque cela est nécessaire, sur les critères les meilleurs à observer.

d) Déterminer, pour chacune des différentes méthodes, le minimum de données susceptibles de fournir une mesure valable des vents ionosphériques.

e) Déterminer quel est le réseau minimal de stations et quelles méthodes il convient d'appliquer pour obtenir un tableau synoptique mondial des vents, en tenant compte de l'importance de la distribution en fonction de l'altitude.

f) Réviser et rédiger à nouveau les manuels d'instructions pour les différentes méthodes d'observations de vents, de manière à ce que chacune de ces méthodes puisse être appliquée facilement par les opérateurs.

g) Il est suggéré que le Groupe de travail comprenne MM. Wright (président), Kushnerevsky, Pfister, Pigott, Rawer, Spizzichino et Sprenger. Les autres chercheurs intéressés seront invités à fournir leurs contributions par correspondance.

RECOMMANDATION III.8. — *Colloque sur les vents ionosphériques.*

L'URSI,

notant que l'interprétation et l'analyse des différentes méthodes de mesure des vents doit faire l'objet de discussions scientifiques plus approfondies,

recommande l'organisation en automne 1967, éventuellement en association avec l'Assemblée générale de l'UGGI, d'un Colloque sur la signification physique des données sur les vents ionosphériques, au cours duquel une attention particulière serait consacrée à l'analyse synoptique.

RECOMMANDATION III.9. — *Nomenclature pour les sondages ionosphériques par le haut.*

L'URSI,

notant l'avis de sa Commission III,

recommande, pour l'interprétation des sondages ionosphériques par le haut, l'adoption et l'application de la nomenclature, des définitions et procédure décrits en Annexe, considérant que ceux-ci sont en conformité avec les recommandations de l'URSI relatives aux sondages à partir du sol, données dans « URSI Handbook of Ionogram Interpretation and Reduction », par Piggott et Rawer (Elsevier 1961).

Annexe

La nomenclature et la procédure ci-dessous se fondent sur les expériences décrites dans le rapport DRTE 9511-40(R) du Groupe canadien ayant la charge des satellites Alouette. Celui-ci a approuvé certaines modifications tendant à les rendre conformes aux méthodes employées pour les sondages ionosphériques à partir

du sol. Ces modifications ne seront pas appliquées aux données analysées avant la diffusion du présent document.

1. — *Nomenclature*

d' — profondeur virtuelle de la trace de l'écho en-dessous du satellite.

*f*N — fréquence de la flèche de plasma qui se produit pour X = 1.

*fo*S — fréquence de la trace de réflexion de l'onde ordinaire (X = 1) au niveau du satellite.

*fx*S — fréquence de la trace de réflexion de l'onde extraordinaire (X = 1 — Y) au niveau du satellite.

*fz*S — fréquence de la trace de réflexion de l'onde *z* (X = 1 + Y) au niveau du satellite.

*fz*I — fréquence à laquelle la trace de réflexion de l'onde *z* tend vers un retard infini [$X = (1 - Y^2)/(1 - Y_L^2)$].

*f*T — fréquence de la flèche observée à la limite de la propagation transversale ($X = 1 - Y^2$).

*f*H — gyrofréquence des électrons. Dans les tables : fréquence de la flèche à la gyrofréquence des électrons.

*nf*H — fréquence de la flèche du n^e harmonique de la gyrofréquence des électrons, excepté pour $n = 1$.

*f*E*s* — fréquence maximale à laquelle une trace presque continue est observée pour E*s*.

*h*S — altitude du satellite au-dessus du niveau moyen des mers.

Lettres qualificatives :

H — (pour emploi exclusif dans les tables *f*N) — lettre qualificative placée après la valeur numérique et indiquant que *f*N a été déduit de *d*T en utilisant *f*H.

D — lettre qualificative placée après la valeur numérique et signifiant : supérieur à la valeur numérique.

E — lettre qualificative placée après la valeur numérique et signifiant : inférieur à la valeur numérique.

J — lettre qualificative placée après la valeur numérique et indiquant que le paramètre a été déduit d'un paramètre de l'onde extraordinaire observée.

N — lettre qualificative placée après la valeur numérique et indiquant que le paramètre a été déduit d'une valeur observée de *f*N.

O — lettre qualificative placée après la valeur numérique et indiquant que le paramètre a été déduit d'un paramètre de l'onde ordinaire observée.

U — lettre qualificative placée après la valeur numérique et signifiant valeur incertaine.

Z — lettre qualificative placée après la valeur numérique et indiquant que le paramètre a été déduit d'un paramètre de l'onde *z* observée.

Emploi :

1) Les lettres qualificatives doivent être suivies d'une lettre descriptive qui indique pourquoi la qualification est faite.
2) Dans le cas où, la valeur directe étant mesurable avec la précision nécessaire, une valeur déduite aurait été néanmoins employée, la lettre qualificative doit être répétée comme lettre descriptive.

Lettres descriptives : Pour les sondages par le haut, la liste des lettres descriptives normalisée pour les sondages à partir du sol [1] est adoptée avec, si nécessaire, adjonction d'une lettre qualificative répétée (emploi n° (2) ci-dessus).

Remarques :

— *f*N est la fréquence de plasma à proximité du satellite.

— *f*N et *fo*S sont numériquement identiques dans des conditions d'observation idéales, mais décrivent des phénomènes différents.

— *f*T est la fréquence hybride supérieure.

Emploi de J : Si Q est la lettre descriptive appropriée, *fo*S *j*Q signifie que *fo*S a été déduit de la valeur observée de *fx*S, la valeur observée n'étant pas mesurée en raison de Q. *fo*SJJ signifie que *fo*S a été déduit de *fx*S, bien que *fo*S puisse être mesuré avec la précision nécessaire.

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[1] PIGGOTT-RAWER : « URSI Handbook of Ionogram Interpretation and Reduction » Elsevier 1961.

Emploi de H : Lorsque *f*N est déduit de *f*T et *f*H, parce que la valeur de *f*N était trop basse pour pouvoir être observée directement, il faut employer *f*N HE. Dans les autres cas, employer la lettre descriptive appropriée indiquant que *f*N n'a pu être observé directement, ou bien HH s'il y a lieu.

2. — *Procédure*

Il est recommandé d'établir les ionogrammes par le haut comme suit : la fréquence doit augmenter de gauche à droite et la profondeur apparente sous le satellite du haut vers le bas, la profondeur zéro se trouvant située en haut.

RECOMMANDATION III.10. — *Mesures de l'absorption ionosphérique.*

L'URSI,

notant l'expérience acquise au cours des dernières années par sa Commission III dans le domaine des différentes méthodes expérimentales permettant de mesurer l'absorption ionosphérique,

recommande :

1) que les Comités nationaux de l'URSI encouragent la mise en service de stations supplémentaires effectuant des observations de type A1 et A3, en particulier dans les zones où ces observations ne sont pas effectuées à l'heure actuelle;
2) que les observations de type A1 soient effectuées de préférence sur quatre fréquences (largement espacées), partout où cela est possible;
3) que le Comité de l'URSI pour la physique solaire-terrestre se charge de publier et de diffuser les manuels d'instructions de l'AGI et des AISC pour les méthodes A1, A3 et la nouvelle méthode A4 (réflexions partielles), dans une forme appropriée à l'emploi par les opérateurs et en tenant compte des commentaires formulés en Annexe;
4) que le Comité de l'URSI pour la physique solaire-terrestre étudie les problèmes de l'analyse et du dépouillement, comme indiqué en Annexe.

Annexe

Activités proposées :

1. En ce qui concerne la *méthode A1* (réflexion d'impulsions) :

a) étudier les effets des inégalités de l'ionosphère sur l'absorption avec déviation, en particulier à proximité de la fréquence cri-

tique, ainsi que toute méthode permettant de minimiser ces effets;

b) étudier les problèmes de l'analyse et du dépouillement des mesures automatiques de l'amplitude, et en particulier la possibilité d'erreurs systématiques inhérentes aux méthodes manuelles.

2. En ce qui concerne la *méthode A2* (atténuation du bruit cosmique) :

a) déterminer les conditions dans lesquelles les observations A2 peuvent être utilisées pour mesurer les variations de l'absorption normale (la méthode pour l'étude des événements étant bien établie);

b) rassembler, comparer et faire connaître les méthodes d'étalonnage pour les observations de type A2;

c) étudier l'influence de l'ouverture et des lobes latéraux des antennes sur la précision de l'étalonnage et la sensibilité aux brouillages;

d) étudier la cohérence des données pendant de longues périodes.

3. En ce qui concerne la *méthode A3* (intensité du champ d'ondes entretenues) :

a) inviter le Dr Schwentek à préparer à l'intention des opérateurs un manuel pour utilisation aux hautes fréquences;

b) inviter le Prof. Lauter à préparer à l'intention des opérateurs un manuel pour utilisation aux très basses, aux basses et aux moyennes fréquences.

4. En ce qui concerne la *nouvelle méthode A4* (réflexions partielles) :

a) inviter le Dr Belrose à préparer un texte donnant la description de l'équipement pour mesurer les réflexions partielles, sous une forme qui en permettra l'utilisation par les chercheurs ne possédant pas d'expérience dans ce domaine;

b) inviter le Dr Belrose à préparer à l'intention des opérateurs et sous une forme qui leur sera accessible, un manuel comprenant des instructions détaillées relatives au dépouillement.

RECOMMANDATION III.11. — *Mesure des vents ionosphériques.*

L'URSI,

considérant que sa Commission III a constaté (i) de sérieuses lacunes dans l'étude synoptique des phénomènes de vents dans

l'ionosphère, (ii) une pénurie des renseignements relatifs aux relations entre les données obtenues au moyen de méthodes ou techniques différentes et les données obtenues au moyen d'une seule méthode de mesure des vents, (iii) un développement considérable des méthodes spatiales à l'efficacité desquelles les données synoptiques peuvent contribuer,

recommande :

1) que, pour l'analyse des vents mesurés par la méthode D1, toutes les stations appliquent la « méthode des évanouissements similaires », en tant que méthode d'analyse fondamentale et simple qui leur permettra de comparer leurs données;
2) que les stations qui observent les vents dans l'ionosphère soient encouragées à appliquer des méthodes plus élaborées de dépouillement des résultats aux fins de vérification et de comparaison;
3) que, en Amérique du Nord et dans l'hémisphère sud, un nombre accru de stations appliquent les méthodes radioélectriques à partir du sol;
4) que la comparaison des différentes méthodes de mesure des vents soit encouragée par des programmes d'observation à long terme réalisés par une même station;
5) que les stations conservent leurs données sous leur forme originale ainsi que les paramètres expérimentaux nécessaires, ce qui permettrait une nouvelle analyse éventuelle au moyen de méthodes nouvelles.

COMITE DE L'URSI POUR LA COOPERATION INTERNATIONALE EN GEOPHYSIQUE (URSI-CIG)

RÉSOLUTION 1.

Le Comité URSI-CIG *recommande* instamment que soit poursuivie l'étude de la correlation entre les échauffements stratosphériques et l'absorption anormale des ondes radioélectriques dans la région D pendant l'hiver, en tant que programme d'études spécial après les Années internationales du Soleil calme, en vue d'établir le mécanisme d'interaction et les influences de l'activité solaire à long terme sur les phénomènes. Des recommandations détaillées figurent dans le texte intégral de cette résolution, dans le Compte Rendu de la Sixième réunion du Comité URSI-CIG.

RÉSOLUTION 2.

Le Comité URSI-CIG *recommande* que toutes les institutions qui effectuent des observations radioélectriques contribuant aux programmes internationaux, y compris l'AGI et les AISC, continuent d'envoyer copie de leurs données aux Centres mondiaux de données, conformément au Guide de l'AGI et aux différentes recommandations formulées par l'URSI. Il est particulièrement demandé de transmettre toutes les données des AISC dans les plus brefs délais.

XVth GENERAL ASSEMBLY

Resolutions and recommendations

COMMISSION III ON THE IONOSPHERE

RECOMMENDATION III.1. — *Ionospheric Observation Network.*

The URSI,

noting that Commission III has considered CCIR Opinion (Doc. VI/1001, Oslo 1966) on Routine Ionospheric Soundings, and Study Programme (Doc. VI/1016, Oslo 1966) on Improvement in the World-Wide Ionospheric Observing Programme for Numerical Mapping Purposes,

recommends :

(1) That the Secretary General transmit to CCIR the general agreement of URSI to the CCIR Opinion and Study Programme with the explanatory comments contained in the Annex;

(2) That the ICSU Inter-Union Commission on Solar-Terrestrial Physics study and potentially arrange for the initiation of an International Solar Terrestrial Service to provide, inter alia, the scientific guidance needed in the ionospheric observation networks; and that, pending the establishment of such a service, the URSI-STP Committee continue to have consultants to serve such purposes, and that the CCIR and the URSI National Committees be informed of these recommendations.

Annex

1. With regard to item 1 of the CCIR Opinion (Doc. VI/1001, Oslo 1966) :

(*a*) URSI considers the ionosonde an important tool from the scientific standpoint and thus considers that the measurements from the existing network can contribute importantly to the continuing accumulation of scientific knowledge of the ionosphere, and further notes that many scientific groups make

use of the output of these routine stations in connection with their research on the upper atmosphere including topside ionospheric studies.

(*b*) URSI continues to endorse and support the World Data Centers as the mechanism for making systematic observations of the ionosphere available to the scientific and technical community of interested workers.

2. With regard to item 2 of the CCIR Opinion (Doc. VI/1001, Oslo 1966) and item 1 of the Study Programme (Doc. VI/1016, Oslo 1966) :

(*a*) URSI welcomes the study called for in CCIR Question 313 (VI) on the optimum distribution of observing stations for long term ionospheric predictions and short term synoptic studies.

(*b*) URSI is arranging for a complementary study, under the auspices of the URSI-STP standing committee, of the desirable distribution of systematic stations for vertical and oblique soundings for scientific purposes with opinions, if possible, also on the needs for CCIR purposes, including ionospheric mapping, the results of this study to be communicated to CCIR in good time.

3. With regard to item 4 of CCIR Opinion (Doc. VI/1001, Oslo 1966) :

(*a*) URSI is calling this CCIR Opinion to the attention of groups known to be active on reducing topside sounding data, and urges them to continue to make such data available to World Data Centers and, if possible, in a form suitable to the ionospheric prediction problem.

4. With regard to item 2 of the CCIR Study Programme (Doc. VI/1016, Oslo 1966) :

(*a*) URSI requests that the study referred to in 2.*b*) above include consideration and comments on the CCIR Study Programme as to the practicability of incorporating regular oblique and topside sounding data in the work of numerical mapping of the ionosphere.

RECOMMENDATION III.2. — *Observations for Ionospheric and Solar Indices.*

The URSI,

noting that Commission III endorses CCIR Opinion (Doc. VI/1019, Oslo 1966),

strongly *recommends* that :

(1) The following nine long-established ionospheric observing stations should continue in operation for obtaining the data necessary to the production of the index I_{F2} :

Canberra	Delhi	Slough
Churchill	Godley Head	Tokyo
College	Huancayo	Washington

with only the comment that small changes of location, for example less than about 50 km in middle latitudes, probably will not invalidate the applicability of the data for I_{F2} purposes;

(2) Since the 10.7 cm solar radio flux measurements of the National Research Council, Ottawa, Canada, are the sole basis for a solar index used throughout the relevant scientific and technical fields, the necessary observations should be continued indefinitely;

(3) The Secretary General should send copies of this recommendation to the CCIR and to the institutions concerned, and their corresponding URSI National Committees.

RECOMMENDATION III.3. — *Propagation by Ducting above the Ionization Maximum of the F Region.*

The URSI,

considering that CCIR prepared an interim scientific report (Doc. VI/1036, Oslo 1966) on this subject, and adopted a Question in this regard (Doc. VI/1025, Oslo 1966) which has been referred to Commission III of URSI,

recommends that the URSI-STP Committee set up a small continuing working group to prepare an URSI response to this Question with terms of reference as given in the Annex to this Recommendation.

Annex

The Terms of Reference of the Working Group on Topside Ducting are suggested to be as follows :

(*a*) To consider CCIR Question 316/VI concerning propagation by ducting above the ionization maximum of the F region,

to review and bring up to date the scientific content of CCIR Doc. VI/1036, Oslo 1966, and to stimulate and encourage further work on the problems raised;

(*b*) To consider any other matters concerning the topside ionosphere which Commission III, the URSI-STP standing committee or the Executive Committee of URSI may refer to the Working Group;

(*c*) To report to the URSI-STP Committee at the IQSY meeting in London, 1967, and later as necessary to enable its reports to be forwarded to CCIR in time for consideration at the CCIR Study Group VI meetings;

(*d*) To provide a summarising status report on this subject for the information of Commission III at the XVIth Assembly. It is suggested that this Working Group might consist of : Mr. W. R. Piggott (chairman), Mr. du Castel (secretary), Dr. J. Chapman, and that it make contact with all known active workers.

RECOMMENDATION III.4. — *Physical Nature of Sporadic E.*

The URSI,

considering that CCIR has referred to URSI (Commission III) its Study Programme (Doc. VI/1033, Oslo 1966) on the Prediction of Sporadic E,

recommends :

(1) That the comments given in the Annex be circulated, in the hope that they will stimulate increased attention to the problem of the physical basis and for prediction of sporadic E;

(2) That Dr. Whitehead be asked to compile brief summary reports based on the scientific and technical literature on the physical basis of sporadic E and any potential applications to the prediction problem;

(3) That the Annex and the compilations mentioned under (1) and (2) be communicated as URSI contributions in time for the meetings of CCIR Study Group VI.

Annex

(*a*) URSI was a co-sponsor with COSPAR of a scientific symposium in Vienna, May 1966, which dealt with wind shears in

the E region and other basic points central to the better understanding of the physical processes which lead to sporadic E [1];

(*b*) There have been other recent organized scientific activities on the problems of sporadic E, notably the conference at Estes Park, 1965 [2], which has recently been summarized in the literature, as well as a book length collection of detailed papers [3], and other such activities are in the planning stage;

(*c*) The physical nature or natures of sporadic E is a current topic of considerable interest in scientific circles, and the importance of the subject for practical telecommunications should provide additional incentive for scientists to give attention to this aspect of ionospheric physics and aeronomy;

(*d*) The requirement of CCIR for a system for prediction of sporadic E is an important and logical extension of the basic scientific studies and indeed the degree of success of any prediction system is the ultimate verification of the understanding of the physical processes responsible for sporadic E.

RECOMMENDATION III.5. — *Distribution and Location of Ionospheric Sounding Stations.*

The URSI,

considering that CCIR in its Question 313 (Doc. VI/1015, Oslo 1966) calls for a study of what are the best world-wide ionospheric observing programmes for long-term predictions and for short-term synoptic studies,

recommends that the URSI-STP Committee conduct a complementary study on the desirable distribution and location of ionospheric sounding stations, both vertical and oblique, for scientific studies, with terms of reference as given in the Annex to this Recommendation.

Annex

Additional Terms of Reference of the Working Group undertaking this study are suggested as follows :

(*a*) Account should be taken of the needs of scientific studies both with the sounding data itself and also with sounding data

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(1) Space Research, Vol. VII (in press).

(2) BOWHILL, ed., *Radio Science*, 1, nº 2, Feb. 1966.

(3) MATSUSHITA and SMITH : *Ionospheric Sporadic E* (Pergamon Press 1962).

used in conjunction with other ground-based and with space experiments.

(*b*) Substantive comments should be provided as well if possible on CCIR Opinion (Doc. VI/1001, Oslo 1966) and CCIR Study Programme (Doc. VI/1016, Oslo 1966).

(*c*) Interim reports should be provided in July 1967 and later, in good time for the meeting of CCIR Study Group VI.

(*d*) A summarising status report should be available for the information of URSI Commission III at the XVIth General Assembly.

(*e*) It is suggested that the group be convened by the Vertical Soundings Consultant, W. R. Piggott, and comprise representatives of major institutions active in the scientific use of sounding data, and that the opinion of all interested workers from the fields of radio science, geophysics and space science be invited.

RECOMMENDATION III.6. — *Reference Ionosphere.*

The URSI,

considering that there has been some interest in COSPAR and elsewhere in a project for compilation of a reference ionosphere, analogous to that already published by COSPAR under the title « Reference Atmospheres »,

recommends :

(1) That the URSI-STP Committee establih a Working Group to study further the need for such a reference ionosphere and the practicability of its compilation on the basis of the present knowledge, with terms of reference as given in the Annex to this Recommendation;

(2) That the URSI-STP Committee decide on the basis of the study and in consultation with COSPAR whether to proceed with such a project in association with COSPAR.

Annex

Additional Terms of Reference and suggestions for the study include :

(*a*) Take account of the URSI Commission III opinion that such a reference ionosphere would be useful for many purposes,

but unless compiled in detail to take account, for example at F region heights, of diurnal, geographic, geomagnetic, seasonal, solar cycle and other known variables, might be inappropriately applied by workers not thoroughly familiar with these major complexities.

(*b*) Take account of the URSI Commission III opinion that the compilation would represent a major project which must take account of the massive amount of ground-based data in addition to the data from space experiments, as well as existing international compilations such as those being produced by CCIR.

(*c*) It is expected that the Working Group would make contact in this connection with COSPAR Working Groups II and IV as well as the Chairman of CCIR International Working Party VI/3.

(*d*) It is suggested that Messrs Bowhill, J. W. King, J. W. Wright, D. Carpenter, Chapman and Evans constitute the Working Group, with Bowhill as convener, and that it invite participation by correspondence of any other interested workers.

(*e*) The Working Group is also asked to provide a summarising status report on this subject for the information of Commission III at the XVIth General Assembly.

RECOMMENDATION III.7. — *Working Group on Ionospheric Drift Reduction* .

The URSI,

noting that the reduction of drift data obtained with the various methods (D1 through D4) needs further discussion amongst the specialists,

recommends that the URSI-STP Committee set up a small continuing Working Group to study and make recommendations on the analysis and reduction problems in this field of work, including the points mentioned in the Annex.

Annex

Terms of Reference of Drifts Working Group :

(*a*) To make a careful study of the various methods of data analysis for method D1 in particular, so that stations can be

advised of the relative appropriateness of the various methods of analysis. Such advice should take into account the location of the station and the facilities wich are available there.

(*b*) To discuss the comparative usefulness of the various methods D1, D2, D3 and D4, and to establish the requirements and best methods of data reduction and presentation to keep the results comparable.

(*c*) To examine the question of selection and rejection of data so as to advise on the best criterions to use where it is necessary.

(*d*) To establish what are the minimum data from each of the various methods which can provide a measure of ionospheric drift which will have significance.

(*e*) To advise on the minimum network of stations and methods which might lead to a synoptic picture of world-wide drift, remembering that the distribution with height is important.

(*f*) To examine and rewrite the instruction manuals for the various drift methods, ensuring that each method is described in a manner suitable for use by operators.

(*g*) It is suggested that the Working Group should-include Messrs Wright (chairman), Kushneresky, Pfister, Piggott, Rawer, Spizzichino and Sprenger. Other interested workers should be invited to contribute by correspondence.

RECOMMENDATION III.8. — *Symposium on Ionospheric Drifts.*

The URSI,

noting that the interpretation and analysis of the various methods of drift measurements requires further scientific discussion,

recommends that a symposium on the Physical Significance of Ionospheric Drift Data with particular emphasis on synoptic analysis, be held in the Fall of 1967, possibly in conjunction with the IGGU Assembly.

RECOMMENDATION III.9. — *Nomenclature for Topside Ionospheric Sounding.*

The URSI,

noting the advice of its Commission III,

recommends the adoption and use of the nomenclature, definitions and procedures for the reduction of topside ionospheric soundings as given in the Annex to this Recommendation, noting that these have been made consistent with the previous URSI recommendations for ground-based soundings as given in « URSI Handbook of Ionogram Interpretation and Reduction » by Piggott and Rawer (Elsevier 1961).

Annex

The following nomenclature and procedures are based on the practices set forth in report DRTE 9511-40-(R) of the Canadian Group responsible for the Alouette satellites. Some modifications to make them consistent with ground based ionosonde practice have been agreed to by the Canadian group. These modifications need not be applied to data analyzed before the circulation of this document.

1. — *Nomenclature*

d' — virtual depth of echo trace below the satellite.

fN — frequency of the plasma spike that occurs at $X = 1$.

foS — frequency of the ordinary wave reflection trace ($X = 1$) at the satellite.

fxS — frequency of the extraordinary wave reflection trace ($X = 1 - Y$) at the satellite.

fzS — frequency of the z-wave reflection trace ($X = 1 + Y$) at the satellite.

fzI — frequency at which the z-wave reflection trace approaches infinite retardation [$X = (1 - Y^2)/(1 - Y_L^2)$].

fT — frequency of the spike observed at the limit of transverse propagation ($X = 1 - Y^2$).

fH — the gyrofrequency of electrons. In tables : the frequency of the spike at the electron gyrofrequency.

nfH — frequency of the spike at the n'th harmonic of the electron gyrofrequency, except for n-1,

fEs — top frequency at which a mainly continuous Es trace is observed.

hS — height of the satellite above mean sea level.

Qualifying Letters :

H — (for use in fN tables only) qualifying letter following the numerical value which shows that fN was deduced from fT using fH.

D — qualifying letter following numerical value, which indicates : greater than numerical value.

E — qualifying letter following numerical value, which indicates : less than numerical value.

J — qualifying letter following numerical value, which indicates that the parameter was deduced from an observed extra-ordinary wave parameter.

N — qualifying letter following numerical value, which indicates that the parameter was deduced from an observed value of fN.

O — qualifying letter following numerical value, which indicates that the parameter was deduced from an ordinary wave parameter.

U — qualifying letter following numerical value, which indicates : uncertain value.

Z — qualifying letter following numerical value, which indicates that the parameter was deduced from a z-wave parameter.

Usage :

(1) When a qualifying letter is used it should be followed by a descriptive letter which shows why the qualification was necessary.

(2) When a deduced value is used although the direct value was measurable with adequate accuracy, the qualifying letter should be repeated as a descriptive letter.

Descriptive Letters : The standard bottomside list of descriptive letters [1] is adopted for topside use with the addition of the repeated qualifying letter (usage Ng(2)), where necessary.

Notes :

fN is the plasma frequency close to the satellite.

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[1] PIGGOTT-RAWER : « URSI Handbook of Ionogram Interpretation and Reduction » Elsevier 1961.

*f*N and *fo*S are numerically identical under ideal observing conditions, but describe different phenomena.

*f*T is the upper hybrid frequency.

Usage of J : If Q is the appropriate descriptive symbol, *fo*S *J*Q means that *fo*S has been deduced from the observed value of *fx*S, the observed value not being measured because of Q. *fo*SJJ means that *fo*S has been deduced from *fx*S, although *fo*S could be measured with adequate accuracy.

Usage of H : When *f*N is deduced from *f*T and *f*H because the value of *f*N was too low to be observed directly, use *f*N HE. In other cases use the appropriate descriptive letter showing why *f*N could not be observed directly, or HH as appropriate.

2. — Procedure

It is recommended that topside ionograms be produced with frequency increasing from left to right and apparent depth below the satellite increasing from top to bottom, zero depth being at the top.

Recommendation III.10. — *Ionospheric Absorption Measurements.*

The URSI,

noting the experience gained in recent years by its Commission III with the various experimental methods for measuring ionospheric absorption,

recommends :

(1) That URSI National Committees encourage the setting up of additional A1 and A3 stations, particularly in zones where no observations are made at present;

(2) That A1 observations be made on preferably four (widely spaced) frequencies, wherever possible;

(3) That the URSI-STP Committee arrange for the editing and expanding of the IGY and IQSY instruction manuals for methods A1, A3, and for the new method A4 (partial reflection) in a form suitable for operators, taking account of the comments given in the Annex,

(4) That the URSI-STP Committee study the analysis and reduction problems as mentioned in the Annex.

Annex

Proposed action :

1. with regard to *method A1* (pulse reflection) :

(*a*) to study the effects of ionospheric roughness on deriative absorption, particularly near a critical frequency, and any possible methods of minimising such effects;

(*b*) to study the problems of analysis and reduction of automatic amplitude measurements, in particular the possibility of systematic discrepancies relative to manual methods.

2. with regard to *method A2* (cosmic noise attenuation) :

(*a*) to establish the conditions in which A2 observations can be used to measure the variations of normal absorption (the method is well established for the study of events);

(*b*) to collect, compare and circulate the methods of A2-calibration;

(*c*) to study the influence of antenna aperture and sidelobes on calibration accuracy and proneness to interference;

(*d*) to study the long term consistency of the data.

3. with regard to *method A3* (cw fieldstrength) :

(*a*) ask Dr. Schwentek to prepare an operator's manual for use at *hf*;

(*b*) ask Prof. Lauter to prepare an operator's manual for use at *vlf*, *lf* and *mf*.

4. with regard to *new method A4* (partial reflection) :

(*a*) ask Dr. Belrose to prepare a text describing equipment for measuring partial reflections in a form suitable for use of workers with no experience in this field;

(*b*) ask Dr. Belrose to prepare an operator's manual including detailed instructions for reduction in a form suitable for operators.

RECOMMENDATION III.11. — *Measurement of Ionospheric Drift.*

The URSI,

considering that its Commission III has observed (i) serious gaps in the synoptic study of ionospheric drift phenomena, (ii) a serious lack of information on the relations between data obtained

by different methods or by different techniques applied to the results of a single method of drift measurement, (iii) a considerable development of space methods which require synoptic data for most effective use;

recommends that :

(1) The «similar fade method » for D1 drift analysis be used by all stations as a simple basic method of data analysis which will give comparable data at all stations;

(2) Drift stations be encouraged to use the more sophisticated methods of data reduction for trial and comparison purposes;

(3) More stations be established using ground based radio methods in North American and in the Southern Hemisphere;

(4) Comparison of the various methods of drift measurement be encouraged by long term measurements at the same station;

(5) Stations should retain their data in its original form and all necessary experimental parameters for possible re-analysis by new methods.

URSI-CIG COMMITTEE

Resolution 1.

The URSI-CIG Committee strongly *recommends* that further investigation be made as a special post-IQSY study programme of the correlation between stratospheric warmings and the anomalous absorption of radio waves in the D-region during winter, with a view to establishing the mechanism of interaction and the long-term solar activity influences on the phenomena. Detailed recommendations are included in the full text of this Resolution in the Minutes of the Sixth Meeting of the URSI-CIG Committee.

Resolution 2.

The URSI-CIG Committee *recommends* that all institutions making radio observations contributing to international programmes, including IGY and IQSY, continue to forward copies of their data to the World Data Centres in accord with the CIG Guide and the various URSI recommendations. It is especially urged that all IQSY data be transmitted as soon as possible.

Report of the Italian National Committee

Copies of the Report of the Italian National Committee to the XVth General Assembly are available at the URSI General Secretariat.

Report of the German National Committee

In 1966 for the first time a General Assembly of URSI has been held in Germany. On this occasion a National Report of the German National Committee of URSI has been compiled which is too voluminous to be published in the Proceedings of the General Assembly. Therefore the German National Report 1963-66 has been printed separately. We are very indebt to the German Federal Ministry for Scientific Research for granting the funds for printing the report.

The report has been compiled by the Commission Chairman of the German National Committee of URSI. Very little editing has been done in order to preserve the individual style of the various authors.

It is hoped that this report will give a true picture of the current activities in Germany in the fields of interests to URSI.

Prof. Dr. W. DIEMINGER,
President of the German National Committee of URSI

The report of the German National Committee is available by the Secretary of the Committee Dipl. Phys. A. Ochs, Fermeldetechnisches Zentralamt, Darmstadt, Rheinstrasse 110.

INTER-UNION SYMPOSIUM ON SOLAR-TERRESTRIAL PHYSICS

AUGUST, 1966

Summary Report

(Abstracts from the report delivered by Prof. H. G. BOOKER at the XVth General Assembly)

The idea of the Symposium originated at the 1963 URSI Assembly in Tokyo. At that Assembly many people felt that too many international bodies were holding too many uncoordinated meetings on related aspects of solar terrestrial physics. URSI therefore initiated a move towards coordinated symposia, and Yugoslavia offered its fine facilities in Belgrade for the meeting. Participants were delighted with their stay in Belgrade, and it was my observation that the Yugoslavs were also delighted to have us. Arrangements in Belgrade were ably coordinated by Dr. Bajić.

In sponsoring the symposium URSI was joined by IUGG, IAU and COSPAR.

The program committee for the Belgrade symposium had Mr. Ratcliffe as chairman and Dr. J. W King as secretary. Most of the detailed organization of the program fell on Dr. King and he discharged his task with great competence.

The topics discussed at the symposium and the number of papers presented are summarized in the table on the following page.

The following comments are appropriate :

1. 200 papers were accepted as suitable for presentation, about twice as many as were anticipated.
2. The principal papers were invited. Certain other papers were read in the usual way. The remaining papers could only be summarized, or «reported ». The reporters who did the summarising were the authors of the review papers.

PAPERS AT BELGRADE SYMPOSIUM

	Invited	Read	Reported	Total
Solar Wind	2	15	25	42
Quiet Magnetosphere	2	15	8	25
Disturbed Magnetosphere ..	2	35	26	63
Energetic Particles	2	15	26	43
Temperatures	2	10	9	21
Latest Contributions	—	6	—	6
TOTAL	10	96	94	200

3. 90 % of the papers dealt with the magnetosphere and the solar wind. The most popular topic was the disturbed magnetosphere.
4. The symposium underlined the fact that interest in the magnetosphere is so widespread that URSI is not in a position to hold a comprehensive scientific meeting on the magnetosphere without cooperating with other international organizations. URSI, and particularly Commission IV of URSI, must therefore support Dr. Friedman's new Inter-Union Commission on Solar Terrestrial Physics.

The review papers are to be published in a special volume. The authors are :

Solar Wind : LÜST and PARKER.

Quiet Magnetosphere : DUNGEY and NESS.

Disturbed Magnetosphere : OBAYASHI and TROITSKAYA.

Energetic Particles : KRASSOVSKY and O'BRIEN.

Temperatures in the Ionosphere and Magnetosphere : EVANS and GRINGAUZ.

A 144 Book of Abstracts was issued to all participants. An excellent way to gain a picture of what was presented in Belgrade is to borrow a copy of the Book of Abstracts and read it.

NATIONAL COMMITTEES

Germany

MEETINGS

As a rule, the German National Committee of URSI and the Nachrichtentechnische Gesellschaft arrange two professional meetings per year. Some 120 persons are invited to the annual meeting at the castle in Kleinheubach on the Main. The second meeting is arranged by the so-called « Arbeitskreis Wellenausbreitung » (Working Group on Wave Propagation). This group is composed of about 20 participants and meets at selected places.

At Kleinheubach pure scientists meet with applied scientists, radio engineers with meteorologists and geophysicists, all of whom are concerned with the physics of the atmosphere and the propagation of electromagnetic waves and who attack the various problems from the point of view of their special field of activity. Short lectures of about 20 minutes each outline the progress and the results of the work performed by the individual institutes. These lectures are immediately followed by rather lively discussions where ideas are exchanged and conclusions are drawn. For all interested groups the papers are compiled in the « Kleinheubacher Berichte » (Kleinheubach Reports), the 11th issue of which is now being published. Copies may be obtained from the Secretary Dipl. Phys. A. Ochs, Fernmeldetechnisches Zentralamt, Darmstadt, Rheinstr. 110.

While the meetings of Kleinheubach concentrate mainly on the exchange of ideas and the cultivation of personal contacts, the Working Group on Wave Propagation goes one step further. Findings and problems in the field of radio services are submitted and are taken as a basis for the establishment of specific questions and study programmes. This practice is similar to that of the CCIR. Thus, this smaller group, which consists only of radio engineers and radio meteorologists, does not only exchange ideas but is also able to co-ordinate their work so that unnecessary duplication can be avoided as far as is possible.

Hungary

MEMBERSHIP

Dr. G. Bognar, Academician, Vice-director of Research Institute, President of the Committee.

Dr. G. Almássy, Professor.

Dr. E. Asc, Director of Research Institute.

Dr. I. Barta, Corresponding Member of Academy, Professor.

Dr. T. Berceli, Chief of Department.

Dr. S. Scibi, Chief of Major Department.

Dr. E. Flórián, Chief of Department.

Dr. K. Géher, Assistant Professor, Secretary of the Committee.

J. Kuti, Chief of Department.

Dr. Z. Náray, Vice-Director of Research Institute.

Dr. A. Rényi, Academician, Director of Research Institute.

Dr. G. Szigeti, Academician, Director of Research Institute.

The address of the Hungarian National Committee of URSI is as follows : Hungarian National Committee of URSI, Hungarian Academy of Sciences, Department of Technical Sciences, Nádor u.7, Budapest V.

India

1964-1965 PROGRESS REPORTS

The Radio Propagation Unit, National Physical Laboratory, New Delhi, has issued the 1964-1965 Progress Reports, which deal with the progress of the various projects of the unit, and of the new projects undertaken during the period of the IQSY.

The Report shows that the unit's activities were divided in the following areas :

1. Ionospheric physics : Routine vertical sounding and ionospheric true heights.

2. Radio propagation service : Coordination and publication of ionospheric data, prediction of sunspot numbers, ionospheric predictions, associate regional warning centre.
3. Aeronomy : Equatorial ionosphere, physics of the D region, ionospheric processes.
4. Radio astronomy : Multifrequency riometers.
5. Space research : Atmospheric density determination from satellite drag, satellite studies of the outer ionosphere, rocket soundings of the D-region.
6. Interdisciplinary projects, including radio patrols of solar flares, study of F-layer effects with Doppler techniques.
7. International activities.

Japan

LIST OF OFFICIAL MEMBERS

Commission I *on Radio Standards and Measurements* : Prof. S. OKAMURA, Tokyo University, Faculty of Engineering, Bunkyo-ku, Tokyo.

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REPORT OF IONOSPHERE AND SPACE RESEARCH IN JAPAN

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(Special issue for the Symposium on Solar-Terrestrial Physics)

REVIEW PAPER

INDIVIDUAL CONTRIBUTIONS

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Annual Variation in the Magnetospheric Configuration, and Its Influence on the Polar Magnetic Field, by A. NISHIDA, S. KOKUBUN and N. IWASAKI.

Polar *fo*F2 Enhancement before Magnetic Storms, by T. ONDOH.

Solar Cycle Variation in Occurrence of Geomagnetic Bays, by T. ONDOH and Y. SANO.

Development of Magnetic Bay Disturbances and Associated f_{min}-Increases, by Y. SANO and T. ONDOH.

Geomagnetic Storms in the Calm Period, by K. YANAGIHARA and T. TACHIKAWA.

Enhanced Ionization in the Ionospheric F2 Region around Geomagnetic Noon in High Latitudes, by T. OGUTI and K. MARUBASHI.

The Condition of the Upper Atmosphere Based on Electron Density Profiles of the F Region, by N. MATUURA.

Suisse

LISTE DES MEMBRES OFFICIELS

Commission I. — *Mesures et étalons radioélectriques* : Dr J. BONANOMI, rue Observatoire 54, 2000 Neuchâtel.

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Commission VII. — *Radioélectronique* : Prof. Dr F. Borgnis, Bergstrasse 99, 8032 Zürich.

Commission VIII. — *Bruit radioélectrique d'origine terrestre* : Dr J. RIEKER, rue de la Vignette 18, 1530 Payerne.

USA

1967 URSI SPRING MEETING

Call for Papers

The 1967 URSI Spring Meeting will be held in Ottawa, Ontario, Canada during the period May 22-25, 1967 and will be *co-sponsored by the US National Committee* and *the Canadian National Committee of URSI.* Papers are solicited in the fields of interest to the Commissions of URSI :

1. Radio Measurement Methods and Standards.
2. Radio Propagation in Non-Ionized Media.
3. Ionospheric Radio.
4. Magnetospheric Radio.
5. Radio and Radar Astronomy.
6. Radio Waves and Transmission of Information.
7. Radio Electronics.

Authors are invited to submit 200 word abstracts in duplicate, plus, if possible, 1000-word summaries (include one or two key graphs if necessary). The deadline for receipt of abstracts is March 15, 1967 and they should be sent to : Prof. George SINCLAIR, Dept. of Electrical Engineering, University of Toronto, Toronto 5, Ontario, Canada; or to : Prof. Alan T. WATERMAN, Jr., S. E. L. (Stanford Electronics Laboratories), Stanford University, Stanford, Calif. 94305.

Persons attending the Spring Meeting in Ottawa may wish to plan a visit to EXPO 67, Canada's World's Fair being held in Montreal, arrangements should be made immediately to reserve rooms there. For information write to : LOGEXPO, EXPO 67, Cité du Havre, Montreal, P. Q. ,Canada.

Information on room reservations in Ottawa for the Spring Meeting will be furnished at a later date.

October 15, 1966.

ANNOUCEMENT OF NEW PUBLICATION

Hydromagnetic Wave Propagation Near 1 *c/s in the Upper Atmosphere* (Part I) *and the Properties and Interpretation of Pc* 1 *Micropulsations* (Part II) by John A. Dawson, National Bureau of Standards Technical Note 342, June 1966, 70 pages, 40 cents.

Part I deals with dispersion and polarization relations which are developed from basic considerations for a hydromagnetic wave at about 1 c/s propagating in a cold uniform plasma. The treatment is then extended to include the effects of ion-electron collisions. Finally the theory is extended to include the effects of a multicomponent plasma.

Part II shows that a reasonable hydromagnetic model for the propagation of pc 1 micropulsations is one in which Alfvén (left-hand) waves travel along field lines to reach the earth's surface at auroral latitudes and then propagate towards the equator as modified Alfvén (right-hand) waves just above the ionosphere. It is shown how many of the observed properties of pc l's can be related to such a model.

Orders may be sent to the Superintendent of Documents, US Government Printing Office, Washington DC 20402.

RADIO SCIENCE

The following papers are published in V. 1, n° 7, July, 1966 of Radio Science :

Transhorizon propagation measurements from a simultaneous frequency and angle scan experiment. J. W. STROHBEHN and A. T. WATERMAN, Jr.

The angular spread of radio waves in long-distance ionospheric propagation. H. A. WHALE.

A comparison of long-distance HF radio-signal reception at high and low receiving sites. M. R. EPSTEIN, V. R. FRANK, G. H. BARRY and O. G. VILLARD, Jr.

Baseband multipath fading simulator. W. F. WALKER.

The effect of collisions upon the virtual heights of low-frequency radio waves reflected from the ionosphere. A. J. FERRARO and C. P. TOU.

Groundwave propagation across semi-infinite strips and islands on a flat earth. R. J. KING and W. I. TSUKAMOTO.

Quasi-oscillations of cold, sharply bounded plasmas. William M. LEAVENS and Ileana B. LEAVENS.

Potentials for cylindrical warm plasmas. Maurice I. SANGER.

Wave propagation in plasmas with very strong magnetic field. S. W. LEE, C. LIANG and Y. T. LO.

On axis far-field backscattering from flared axially symmetric bodies. Herschel WEIL and Joseph L. RAYMOND.

Determination of the admittance and effective length of cylindrical antennas. R. W. P. KING, E. A. ARONSON and C. W. HARRISON, Jr.

Precautionary note on stratification. Roy N. ADAMS and Eugene D. DENMAN.

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On Walsh and Weil's defense of the conventional method. K. S. H. Lee and C. H. Papas.

Radiation and propagation of electromagnetic waves from moving sources. Robert M. Lewis and Walter Pressman.

On the admittance of the infinite cylindrical antenna. R. L. Fante.

A modified Fock function for the distribution of currents in the penumbra region with discontinuity in curvature. S. Hong and V. H. Weston.

A note on the Lorentz transformations for a moving anisotropic plasma. B. R. Chawla and H. Unz.

Impedance of an insulated linear antenna between layers of compressible plasma. Janis Galejs.

Boundary conditions for a unique solution to the linearized warm-plasma equations. Maurice I. Sancer.

A possible mechanism for excessive mode conversion in the earth-ionosphere waveguide. James R. Wait.

A numerical method for interpreting D-region radio pulse interaction measurements. T. M. Georges.

Non-linear interaction of a number of electromagnetic waves in a magnetoplasma. Predhiman Krishan Kaw.

Group propagation in the whistler-hydromagnetic extension of magnetoionic theory. Gideon Kantor and Frank Pivarunas.

Role of a complex ionic composition in the wind-shear theory of sporadic E layers. Laurent Cuchet.

Sporadic E at night. J. D. Whitehead.

A world atlas of atmospheric radio refractivity (Digest). B. R. Bean, B. A. Cahoon, C. A. Samson and G. D. Thayer.

Some highlights of a symposium on subsurface propagation of electromagnetic waves. Paris, April 25-28, 1966. James R. Wait.

COMMISSIONS AND COMMITTEES

Commission I on Radio Measurements and Standards

CONFERENCE ON PRECISION ELECTROMAGNETIC MEASUREMENTS

This Conference will be held June 25, 26, and 27, 1968 at the US National Bureau of Standards in Boulder, Colorado. There is some possibility that the conference will extend into June 28th (the 1966 conference ran 3 ½ days) but this will not be known until the papers are selected about three months ahead of the meeting.

The Conference is sponsored by :

National Bureau of Standards : Institute for Basic Standards.

Institute of Electrical and Electronic Engineers : Group on Instrumentation and Measurements.

International Scientific Radio Union : US Commission I.

The Conference Chairman is Dr. Helmuth, M. Altschuler, of the National Bureau of Standards Laboratories in Boulder. Vice-Chairman is Dr. Kiyo Tomiyasu of the General Electric Company, Schenectady, New York. The Technical Program Chairman is Dr. Donald D. King of the Aerospace Corporation in Los Angeles, California. The Secretary is J. F. Brockman, National Bureau of Standards, Boulder, Colorado 80302.

Commission III. — Ionosphère

ABSORPTION IONOSPHERIQUE

Communications présentées à la Réunion des ionosphéristes européens

(BRUXELLES, MARS 1965)

Preliminary results of absorption measurements at different latitudes, W. DIEMINGER.

The determination of absorption in the ionosphere by recording the field strength of a distant transmitter, H. SCHWENTEK.

A survey of A3-absorption at low and medium frequencies, E. A. LAUTER.

La mesure de l'absorption ionosphérique des émissions de radiosources et son apport à la connaissance de l'ionosphère, P. SIMON.

Relations entre certaines formes de l'absorption ionosphérique et les phénomènes solaires et géophysiques, M. PICK.

The contribution of the ionospheric F region to cosmic noise absorption, J. TAUBENHEIM, U. HENSE and W. LIPPERT.

Conclusions de la réunion consacrée à l'absorption ionosphérique tenue à Bruxelles du 23 au 25 mars 1965, K. RAWER.

Ces communications, publiées dans les Annales de Géophysique (t. 22, fasc. 2, 1966) ont été réunies dans une brochure par l'Institut Royal Météorologique de Belgique, avenue Circulaire 3, Bruxelles 18.

Commission IV on the Magnetosphere

COOPERATIVE OBSERVATIONS OF ELF AND ULF

At time of a recent conference on low-frequency natural phenomena by research workers in USA and Japan, an agreement, described hereunder, was reached to make effective observations to study the natural phenomena over the Pacific area in detail.

The participants of the conference hope that if the research workers in other parts of the world would make similar observations at their stations, they would also be able to study the phenomena through the exchange of simultaneous data. This would give a great benefit for the understanding of the natural ELF phenomena over the world.

* * *

The following periods are suggested as the cooperative observation periods for natural ELF and ULF phenomena over the Pacific area.

I. The week from Wednesday, Feb. 15, 1967, 00 : 00 UT to Wednesday, Feb. 22, 1967, 00 : 00 UT.

II. The week from Wednesday, March 15, 1967, 00 : 00 UT to Wednesday, March 22, 1967, 00 : 00 UT.

Observers who operate only for short periods (5 or 10 minutes) should always record at the beginning of each hour.

The observation schedule should be publicised widely to invite the participation of research all over the world also, so that they can make a fruitful analysis through mutual exchange of the simultaneous data. In particular measurements should be solicited on « World Geophysical Days » during the specified longer observation periods.

Whenever ELF data are exchanged the following characteristics of the receiving equipment shall be specified, so that data can be compared effectively :

I. Geographic and geomagnetic coordinates of observing station.

II. Whether electric or magnetic field sensors or earth current sensor is used.

III. If magnetic field sensor is employed, direction of field component measured.

IV. Relative amplitude versus frequency characteristics of the *entire* system (including sensor and recording system) and bandwidth of filters (between minus 1 dB and minus 3 dB points) for narrow band records.

V. When analysis of individual energy bursts or impulses is involved : internal time delay of system for a pulse applied to specified points in the system or (and) phase shift versus frequency for sinusoidal input.

VI. Absolute sensitivity of system in (volts per meter)^2/cycle for E-field or (Ampere per meter)^2/cycle for H-field (or equivalent by (gamma per meter)^2/cycle for B-field).

VII. For paper records : paper speed and response time of pen system.

VIII. For magnetic tape records : width of tape, number of channels on tape, recording speed and carrier frequency in case of F. M. records.

IX. When integrated spectra are given : integration time.

Plans for « Slow tail » observations

First observations are to record ELF atmospherics originating in south-east Asia and the China Sea. The first group of observations will follow the schedule below-

1967 Date	Time, UT	Obs. period
Feb. 15	11 : 00	10 minutes
Feb. 15	11 : 20	30 seconds
Feb. 15	11 : 30	30 seconds
Feb. 15	11 : 40	30 seconds
Feb. 15	11 : 50	30 seconds
Feb. 17	(Same as above)	
Feb. 20	(Same as above)	
Feb. 22	(Same as above)	

The observation periods are limited in duration because of paper recorder speed and paper supply. Accurate spectrum analysis of the data requires a relatively high speed record. The slow speed record, lasting for 10 minutes, will be very useful in these first few observations to estimate rates of occurrence and adjust equipment sensitivities at the observatories.

The next group of observations are planned for the March 15-22 period. The exact schedule will be decided after the data from the first observations are examined.

Remark : The details of the cooperative observation over the Pacific area are obtainable on request from either : Prof. C. POLK, Department of Electrical Engineering, University of Rhode Island, Kingston, R. I., USA, or Prof. K. MAEDA, Department of Electronics, Faculty of Engineering, Kyoto University, Kyoto, Japan.

Commission V on Radio Astronomy

WORKING GROUP ON THE ABSOLUTE CALIBRATION OF SOLAR RADIO FLUX DENSITY

Dear Colleague,

At the XVth General Assembly of URSI in Munich, a proposal was made by Tanaka for organizing the international working

group on the absolute calibration of solar radio flux density and this proposal was adopted by Commission V at the Business Meeting on September 12, 1966. The membership is as follows :

COVINGTON, A. E., NRC of Canada.

DAENE, H., Deutsche Akademie der Wissenschaften zu Berlin.

FOKKER, A. D., Sterrewacht Sonnenborg der Rijksuniversiteit.

MOLTSCHANOV, A., University Leningrad.

TAKAKURA, T., Tokyo Astronomical Observatory.

TANAKA, H., Nagoya University — convener.

TLAMICHA, A., Ondrejov Observatory.

It has become clear that (1) there is a discrepancy of about 20 % between HHI (1500 Mc/s) and Toyokawa values if the latter are temporarily corrected according to the recent experiments (1.11, 1.05, 0.96 and 1.08 for 1000, 2000, 3750 and 9400 Mc/s respectively) and that (2) there is a discrepancy of about 10 % between Ottawa (2800 Mc/s) and temporarily corrected Toyokawa values even if the former are corrected by a factor of 0.95 according to Mr. Covington's recent experiments. Mr. Covington has suggested that there is a possibility of existing a hump between 2000 and 3750 Mc/s. The values at Prague (536 Mc/s) are not yet absolutely calibrated.

To solve the problem of these discrepancies, the following proposals were made at Munich.

1. Drs Daene and Krüger will try to construct two standard horns, the one at 1500 Mc/s and the other at 2000 Mc/s which is the same with one of the four frequencies at Toyokawa.
2. Dr. Tlamicha will construct a standard horn at 536 Mc/s.
3. Dr. Moltschanov proposed to use the moon as a standard.
4. Dr. Fokker proposed to offer the space in the « Information Bulletin on Solar Radio Observatories » as the place for discussions.

On September 26-28, Tanaka met Mr. Covington and talked about the possible need of reexamining the calculation gain of the standard horn at Ottawa.

Tanaka and Kakinuma are thinking of calibrating a few points between 2000 and 3750 Mc/s.

There seems to be a bright hope of solving the problem in the near future, and it is expected that some preliminary results will be reached on occasion of the IAU Meeting next year. Any comments or discussions are quite welcome but please send copies to all the members of the Working Group.

The quick circulation of the data would be quite helpful for the present work, so please distribute the data by airmail as soon as possible. The enclosed data from Ondrejov Observatory would be a good example.

Expecting that our Working Group would be successful.

Yours sincerely,

November 7, 1966.

H. TANAKA,

Convener
The Research Institute of Atmospherics, Nagoya University,
Toyokawa, Aichi, Japan.

IQSY

To : Airglow and Ionospheric Stations.

The airglow pre-dawn project

It has been known for some considerable time that there is a close correlation between electron densities in the F2 layer at night and the intensity of the 6300A oxygen line in the night airglow. More recently, very careful observations have been made of the variations in intensity of the 6300A radiation during the period leading up to local sunrise. These measurements have shown that there is a sudden increase in the intensity at a time which corresponds not with the time of local sunrise, but with the time of sunrise in the ionosphere at the magnetic conjugate point. Theoretical work suggests that this effect is due to the streaming of photo-electrons along the line of magnetic field which joins two conjugate points.

The pre-sunrise measurements of airglow have been carried out with the necessary precision and time resolution only at a few stations and, in order to gain further information about this phenomenon, it will be necessary to obtain observations from a much wider range of latitudes. The time resolution which is at present used or reported in the normal programme of airglow observations is not sufficiently high to permit the study of the sudden increase in intensity mentioned above. Moreover, the data which are available in the World Data Centres are not always in a form suitable for analysis in connection with these investigations.

It seems very likely that the conditions under which photo-electron streaming takes place will vary with the sunspot cycle and for this reason it is particularly desirable to attempt to obtain some measurements during the coming Northern Hemisphere winter while solar activity is still low. Otherwise, these measurements must await next solar minimum which will not occur until about 1975. With the agreement of Dr. F. E. Roach, the IQSY

Reporter for Airglow, it has been decided to encourage existing airglow stations which are interested in this problem to make the necessary modifications to their observing programmes during the Northern Hemisphere winter which is just beginning, and to agree on some form of cooperative study of the results obtained.

Since the phenomenon being studied is so closely related to ionospheric characteristics, it seems possible that a few ionospheric stations may be interested in installing a photometer which could be used to complement their ionospheric measurements.

More detailed information concerning photo-electron streaming and its results in terms of ionospheric and airglow measurements are contained in an article which has been prepared by Dr. H. C. Carlson of the Arecibo Ionospheric Observatory (see Annex). Dr. Carlson has been personally engaged in making measurements of this kind and has agreed to act as the coordinator of this limited project.

Any senior members of the staff at airglow or ionospheric stations who are interested in pursuing the possibility of participating in this project are kindly requested to write to Dr. Carlson at the address given below and to indicate whether they would be prepared to cooperate on the lines indicated in the Annex to this letter : Dr. H. C. CARLSON, Ionospheric Observatory, P. O. Box 995, Arecibo. Puerto Rico, USA.

As stated above, there is some urgency in beginning the work as soon as arrangements can be made and it would be appreciated if Dr. Carlson could be informed as soon as possible and before the middle of November at the latest.

IQSY Secretariat,
6 Cornwall Terrace,
London, NW1.

C. M. MINNIS,
Secretary,
IQSY Committee.

Ionospheric effects of photo-electrons from magnetically conjugate points and the study of these effects using observations of airglow at 6300A

by H. C. CARLSON, Arecibo Ionospheric Observatory

It is desired to make two points; first, photo-electrons streaming between magnetically conjugate ionospheres (m.c.i.) are of

importance in terms of their effect on the ionospheric F region and the magnetosphere; and second, airglow observations at 6300A can be a potent tool for the study of these photo-electrons.

Hanson (1963) has suggested the possibility of streaming of photo-electrons between m.c.i. on theoretical grounds. With increasing altitude, the density of the neutral atmosphere decreases and eventually the mean free path of the photo-electrons exceeds the scale height of the neutral atmosphere. An appreciable fraction of the photo-electrons produced near and above an altitude of about 300 km in the 10-30 eV enregy range (Mariani 1964) can escape upwards without collision and spiral along magnetic field lines to the m.c.i. On first entering the conjugate ionosphere from the topside, the photo-electron flux, essentially independent of altitude, mainly loses its energy directly to the ambient electrons, thus raising the electron temperature T_e. Then, descending to levels of rapidly increasing neutral particle densities, the photo-electrons are rapidly thermalized somewhat below 300 km, and lose the bulk of their energy through inelastic collisions with atomic oxygen.

The streaming of photo-electrons manifests itself most directly and sensitively in the heating of the ambient electrons in the upper F region, especially when only one of the two m.c.i. is sunlit. At the Arecibo Ionospheric Observatory (AIO), T_e in the F region has been observed to start increasing more than 2 hours before local sunrise in mid-winter, and to increase by several hundred ^oK before local sunrise heating begins. This increase in T_e before local sunrise has been observed at AIO at heights up to 1200 km. At the French backscatter station, this effect is even more dramatic; it sets in 4 hours before local sunrise in mid-winter and T_e actually increases to its daytime level so that T_e does not change appreciably at local sunrise (Carru *et al.*, 1966).

The consistency of the observations with the interpretation based on the conjugate-point photo-electron mechanism has been reviewed by Carlson (1966*a*). First we consider the two times of onset of the increase of T_e before and during the local sunrise period; these are the two points at which there is a break in the slope of the T_e vs. time plot for a given altitude at or above 300 km. Observations at AIO during the winter of 1965-66 show that the local sunrise increase in T_e starts when the solar zenith angle χ is 98-99^o at the local ionosphere. Similarly the conjugate-point

sunrise increase in T_e starts when $\chi = 98\text{-}99^o$ at the m.c.i. Also the maximum rate of increase of T_e with time during the conjugate point sunrise period is about 4^o K min^{-1} independent of season, and this requires that the minimum flux of conjugate photo-electrons shall be $10^8 cm^{-2} sec^{-1}$; this value is consistent with theoretical estimates of the flux. In winter when the ionosphere is pre-heated towards its day-time temperature, the maximum rate of increase of T_e with time is less than half that observed during the equinox sunrise when both the m.c.i. experience sunrise simultaneously.

Also, AIO observations of the composition in the 0^+ to H^+ transition region show that the rates of change of composition at sunrise and sunset are greater in summer than in winter and that the minimum altitude of the contours of constant composition shifts from local sunrise in summer to shortly after midnight in winter (Carlson and Gordon, in press). These seasonal differences are ascribed to the effect of photo-electrons which stream from the sunlit m.c.i. and which, in winter, cause the local ionosphere to approach its day-time conditions well before local sunrise and to maintain them well beyond local sunset.

Since T_e and composition are affected, it necessarily follows that scale heights, and thus electror-density distributions, must be affected by the conjugate-point photo-electrons during the local night whenever χ in the m.c.i. is less than roughly 99^o, and also during the «initial condition» sunrise period and the sunset period (Eyfrig, 1963; Carlson, 1966*b*) where rates of change of T_e and of composition with time are affected. The question also can seriously be raised as to whether photo-electrons streaming between the m.c.i. can couple daytime electron-density perturbations. Haubert and Laloe (1963) have noted the occurrence of *fo*F2 perturbations for which they could offer no explanation other than to note their coincidence with times of eclipses in the m.c.i. On occasions perturbations observed in the diurnal variation of *fo*F2 at AIO, but which are absent at nearby stations, have been observed to be present also near the conjugate point.

The bulk of the photo-electron energy is lost, below 300 km, in collisions with atomic oxygen in which excitation of the ^1D state is important; this fact raises the question of a pre-dawn enhancement of the 6300A airglow line. Such enhancements have been observed for some time and Cole (1965) has proposed an

explanation for them in terms of photoelectrons streaming from the sunlit m.c.i. Cole justified his explanation on the basis of observations made in Haute Provence (S. France) which showed the motion of an advancing front of enhancement which matched the motions of the sun's shadow in the m.c.i.

Through the help of Dr. F. E. Roach, a photometer was obtained and installed at AIO in February 1966. On the few remaining days suitable for observations in that winter period, a pre-dawn enhancement of 6300A was indeed observed to occur at the time of sunrise ($\chi = 99^o$) in the m.c.i. (Carlson, in press).

An interesting use for an individual 6300A airglow station can be suggested. One could plot the time of onset of enhancement vs. the date of the year and then, for an assumed magnetic conjugate point, plot contours of fixed solar zenith angle. An error in the estimate of the longitude of the conjugate point would shift the contours in time, and an error in latitude would change their shape; thus one could make a best-fit estimate of the location of the conjugate point which would be consistent with the times of the observed pre-dawn enhancement. The results of this technique could refine knowledge either of conjugate-point locations or of the altitudes from which the photo-electrons escape depending on which is theoretically better known.

The pre-dawn enhancement will have a low-latitude cut-off where the field lines become practically horizontal and where the difference between the times of local and conjugate-point sunrise becomes small. There will also be a high-latitude cut-off which can be postulated qualitatively to occur as a result either of loss of photo-electrons to the magnetospheric tail, the potential difference set up by their flow becoming too great to overcome, or of losses through coulomb collision with the ambient electrons along the tube of magnetic flux. Observational data on 6300A from a world-wide chain of stations would permit the determination of this high-latitude cut-off and also of its solar-cycle variation; it is probably near 60° geomagnetic latitude at sunspot minimum. These data could provide valuable information concerning the source of the conjugate-point photo-electrons, its energy losses and, to some extent, its energy spectrum in the latitude range where it is of importance for ionospheric and magnetospheric effects.

However, unless some of the existing airglow stations enhance their current observational programs in the immediate future, observational determinations relating to sunspot minimum conditions may have to await the next minimum in about 1975.

PRACTICAL SUGGESTIONS.

It seems desirable to encourage existing airglow stations to extend their observational programs where this is necessary. The aim should be :

(*a*) to establish fairly accurately, at least periodically during the pre-dawn enhancement months, the time of onset of the enhancement, and also preferably

(*b*) to define the shape of the curve of enhancement vs. time near its onset.

To do this, a time resolution of 5 minutes or better is suggested.

Zenith photometers are very suitable; scanning photometers offer the additional option of scanning across the enhancement front and expanding the latitude coverage of a single station. The observations would need to establish a break in the 6300A intensity vs. time plot near the time at which $\chi = 99^{o}$ ($\pm$ a few degrees) at the magnetically conjugate location and before the local station experiences local twilight effects. On request, the author will be happy to provide approximate times of enhancement vs. date to any interested stations.

It seems important also to call the attention of ionospheric laboratories to the potential value of 6300A observations for ionospheric study; to the long-recognized close correlation between night-time 6300A intensity and electron density; and to the possibility of adding a 6300A photometer to an existing ionosonde station for a cost of a few thousand dollars.

ACKNOWLEDGEMENTS.

Acknowledgement is made to Dr. W. E. Gordon for support during much of this work, to Dr. E. E. Salpeter and Dr. F. W. Perkins for discussions, and to Dr. F. E. Roach for help in setting up the photometric observations in Arecibo. The Arecibo Ionospheric Observatory is operated by Cornell University with the support of the Advanced Research Projects Agency under a

research contract with the US Air Force Office of Scientific Research.

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PERMANENT SERVICES

MINUTES AND RESOLUTIONS OF IUWDS STEERING COMMITTEE FIFTH MEETING

Belgrade, Yugoslavia, August 31, 1966

The following were present :

Members :

Mr. A. H. SHAPLEY, Chairman.

Dr. P. SIMON, Acting Secretary.

Miss J. V. LINCOLN, Deputy Secretary.

Dr. K. R. RAMANATHAN (representing Dr. A. P. MITRA for URSI).

Dr. Z. SVESTKA (representing Dr. R. MICHARD, IAU and PFP).

Mme N. BENKOVA (representing Mme R. A. ZEVAKINA, Eurasian Region).

Dr. W. O. ROBERTS (representing World Meteorological Organization).

Liaison :

Mr. J. P. LEGRAND (SPARMO).

Dr. E. S. KAZIMIROVSKY (Siberian Associate Regional Warning Center).

Mr. A. OCHS (Darmstadt Regional Warning Center).

Observers :

Dr. G. KING (New Zealand).

Dr. C. de JAGER (Netherlands).

Mr. R. W. KNECHT (USA).

Dr. H. TANAKA (Japan).

Dr. Y. HAKURA (Japan).

Absent were :

Dr. M. NICOLET, IUGG.

Dr. R. L. SMITH-ROSE, European Regional Committee.

Col. E. HERBAYS, Secretary General URSI.

Dr. H. UYEDA, Western Pacific Regional Committee.

The Chairman opened the meeting recalling that the IUWDS is a permanent service of URSI in association with IAU and IUGG adhering to FAGS. Its activities are in the large number of messages of solar and geophysical information circulated daily throughout the world and in its publications, principally the International Geophysical Calendars, Geophysical Calendar Records and the various reports of IUWDS activities.

The Secretary reviewed in a few words the content of his report to the Committee, and in light of the very limited time available, the Chairman proposed to discuss only the most important questions on the agenda.

GEOALERTS. — Everyone recognizes that there are now too many types of GEOALERTS; this was emphasized by the representatives of Moscow and Irkutsk and by the different reports of the RWC. From a discussion in which most of the members participated, it was concluded that the alerts MAGCALME and SOLCALME should no longer be GEOALERTS but rather be reserved for special forecasts issued upon request to an RWC.

The scientific community requests now that the alerts of exceptional activity be in more precise terms and be issued as possible in advance of the occurrences of the event or phenomenon. It is probable that these predictions will not be accurate each time, but it is necessary to try. Two kinds of prediction are envisaged :

1. prediction of an important event (PROTON FLARE).
2. prediction that a solar center will be active with multiple events but without a proton event (FLARES).

In addition the position of the active center should be given and the prediction would apply to the next 24 hours.

Finally where an important event occurs (PROTON FLARE), it will be announced in the GEOALERT.

The objective of the GEOALERTS have been given : it does not consist of an international program of simultaneous observations during a definite period as that produced during IQSY or as that

recommended in the International Geophysical Calendars but as information; each institution will use this information to carry out its appropriate programs. Nevertheless, it will be helpful to stations and to international cooperation to indicate a suggested beginning and ending time for special observations prompted by GEOALERTS.

ADALERTS PRESTO. — These alerts, dependent upon observation of a solar burst on 10 cm, were requested by geophysicists three years ago. The aim is to alert the interested institutions within one hour.

It appears that this aim cannot be attained when it is necessary to transmit the message from one continent to another. On the other hand, the Space Disturbance Forecast Center at Boulder, Colorado, will be able in the near future to detect important flares automatically in a very short time, in the best conditions within five minutes. Institutes interested can write to Boulder to arrange to receive such alerts.

It was also decided to write to the physicists who first requested the ADALERT PRESTO to learn their desires, and further, because of the importance of the 10 cm bursts to solar and geophysical forecasting, to continue these as special messages, confined to only the observation of relatively very important bursts. The criteria will be given in a circular memorandum.

Sydney. — It was decided to invite the Associate RWC at Sydney to act as a Regional Warning Center for Australasia and Antarctica. It was remarked in this connection that the meteorological center at Melbourne is particularly well equipped for transmission of data.

NERA. — The Chairman told of a letter just received from the organization operating the RWC at NERA, Netherlands, notifying the intention to suspend its activities after 1966.

Dr. de Jager gave some further details on the actual situation at NERA and asked the opinion of the Steering Committee on this decision. After discussion, the Committee agreed on the substance of Resolution 1 given at the end of this report.

STRATWARM. — A discussion was held on the interest of the scientific community in the phenomenon described in the STRATWARM Alerts. It appears that they interest not only the meteorologists but also those doing studies on the ionosphere. Thus this justifies the circulation of these alerts under the aus-

pices of the IUWDS and facilitates the cooperation with WMO in the transmission of the GEOALERTS.

Proton Flare Project. — Dr. Svestka recognized the part taken by the IUWDS in the Proton Flare Project. It emphasizes the rising interest of observatories for coordination of observations during a limited time and for a precise purpose. The PFP will terminate September 30, 1966. Good observations of the event of July 7 were obtained and the project will be renewed without doubt under the same conditions next year.

SPARMO. — Mr. Legrand expressed appreciation for the cooperation between SPARMO and the IUWDS. He thanked IUWDS in particular for its assistance during the Arctic-Antarctic campaign of January-February 1966 and during the summer campaign. To further consolidate this cooperation, the SPARMO council asked that Dr. Simon of the Meudon RWC become a member of the council; the Steering Committee expressed its approval of this liaison between the groups.

A propos of the SPARMO alert system it was pointed out that the alerts are distributed only to members of SPARMO for the launching of balloons and were not a notice of general interest; in fact they are specialized forecasts based on the same information as IUWDS alerts.

Codes. — The Secretary emphasized interest in comprehensive messages about solar activity of the type of synoptic code UEVTA. Their preparation is more difficult, but it permits one to give all the useful information much more rapidly. On this subject Mr. Knecht requested that the development of codes take into account that some groups were beginning to use electronic computers for decoding messages automatically. The codes should be designed so that this decoding can be done with the simplest of computer programs.

Calendar Records. — These publications are unique within the ICSU structure : each Union publishes data in its own field and only IUWDS establishes liaison between the different disciplines in the Calendar Records. An abbreviated version appears in the IQSY NOTES. The final version for 1960-1963 is practically completed and will appear in the Annals of IQSY. The years 1964-1965 will also appear in the Annals of IQSY. However, these compilations require a great deal of work. Upon discussion it appeared that the utility of Calendar Records lies in their rapid

publication. It would seem then that in the future one would envisage a publication less complete but as rapid as possible.

Composition of the Steering Committee. — Dr. de Feiter retired as Secretary in November 1965 and was provisionally replaced by Dr. P. Simon. The Committee agreed that Dr. Simon become the Secretary of the IUWDS.

After exchange of different views the meeting adjourned at 2030 having adopted the following resolutions.

P. SIMON,
Secretary.

RESOLUTIONS OF THE FIFTH MEETING OF THE IUWDS STEERING COMMITTEE

Belgrade, Yugoslavia, August 31, 1966

1. — The Steering Committee of the IUWDS acknowledging the decision of the Netherlands PTT to suspend the activity of the Regional Warning Center at NERA in 1967 :

(i) *wishes to thank* the administration of the Netherlands PTT for its long cooperation with the IUWDS and for all the types of observations which it has given from its station at NERA and overseas;

(ii) *expresses its regrets* for this cessation and for the interruption of the service whose contribution has been appreciated;

(iii) *requests* that steps be taken so that the radio astronomy stations at NERA and Paramaribo continue their activity, in particular for observations on 200 Mc/s and 2800 Mc/s whose importance is known for the recognition of solar activity. It points out the unfortunate consequences that would occur from stopping these measurements in the next three years which correspond to a high level of solar activity;

(iv) *suggests* that Utrecht Observatory consider the possibilities of taking over part of the activity undertaken by NERA, in particular that which concerns the observations and the transmission of data and that which concerns the predictions;

(v) *urges* that the administration of the Netherlands PTT continue to assure on a basis of exchange the transmission of data between Japan and the Netherlands in the interest of the center of Utrecht and of all Europe : it emphasizes the

exceptional interest of this direct liaison for the prediction in Europe of both solar and geophysical phenomena.

2. — The IUWDS *greatly appreciates* the continued opportunity provided it for use of the services of the World Meteorological Organization telecommunications networks for the distribution of its « GEOALERTS » and *notes with thanks* Reolution 8 (EC-XVII) of the 17th Meeting of the WMO Executive Committee which decided these arrangements should continue on a permanent basis.

3. — The IUWDS *strongly recommends* to the responsible national authorities that the Associate Regional Warning Center at Sydney assume the status of a Regional Warning Center for Australasia and Antarctica, and when favorable action will be taken, the IUWDS will plan to modify its rules regarding representation of regions appropriately.

4. — The IUWDS Steering Committee, recognizing the establishment by ICSU of the new Inter-Union Commission on Solar-Terrestrial Physics and the inclusion in its terms of reference, as earlier requested by IUWDS, of the task « to provide the advisory services requested by the International Ursigram and World Days Service », *requests the IUCSTP* to provide the IUWDS, in as specific terms as possible and renewed at roughly annual intervals, with information on the needs of the scientific community in solar-terrestrial disciplines for services of the kind provided by IUWDS, including among others the alerts, rapid data exchange, the annual calendars and the calendar records, and especially with specific recommendations on the scientific programs to be suggested to solar and geophysical stations and institutions for accomplishment on such World Days, and also *invites* the IUCSTP to suggest any new or special services which might be suitable or practical for the IUWDS to provide in support of cooperative research programs in solar-terrestrial physics.

International Geophysical Calendar

Spanish Version

The Argentine National Committee has published a Spanish version of the International Geophysical Calendar for 1967.

INTER-UNION COMMISSIONS

IUCAF

Report of the seventh meeting of the Commission held at the Technische Hochschule, Munich, during the General Assembly of URSI, on 12th September 1966

Present :

Professor F. G. SMITH (in the Chair).
Dr. J. P. HAGEN.
Mr. J. HERBSTREIT.
Mr. F. HORNER.
Dr. H. STERKY.
Professor H. TANAKA.
Dr. R. L. SMITH-ROSE (Secretary General).

In addition the following attended by invitation :

Dr. R. S. LAWRENCE.
Dr. K. RAWER.
Dr. G. W. SWENSON.

1. — In opening the meeting, the Chairman welcomed all those present, and stated that he was glad of the opportunity to discuss some frequency allocation matters during the General Assembly of URSI. Colonel Herbays, while stating that he was available if required, asked to be excused from attendance, as he was fully occupied on URSI matters in Munich.

2. — *Report of Informal Meetings in Oslo — June* 1966.

Concerning the report of the informal meetings in Oslo (Doc. IUCAF/93), Dr. Hagen said that it would clarify matters if the second paragraph of minute 2 were changed to read :

« It was agreed that the attention of all scientists should be drawn to the procedure to be followed through national adminis-

trations in securing a more useful allocation of frequencies for Space Research as an extension of the provisions of the existing Radio Regulations of the ITU ».

Dr. Sterky emphasised the need to educate scientists by published articles and by contributions at international meetings of the interested scientific unions. He suggested that URSI might send a circular letter to all national committees encouraging them to publicise the need for frequencies to be allocated for both radio astronomy and space science through the appropriate national and international organisations.

The Chairman, in supporting these views, said that it was also necessary to encourage individual scientists to report their experiences, including any cases of harmful interference with their observations, through their national committees.

Dr. Hagen emphasised the need for caution in applying for frequencies on an international scale when local, national assignments might suffice on a non-interference basis.

3. — *Additional Frequencies for Space Research.*

In considering Doc. IUCAF/94, it was suggested that the sentence in section 2 beginning; « Cospar Resolution No. 5 adresses... » was out of sequence. As reported in Doc. IUCAF/92, COSPAR is seeking further allocations, some of which are within the sidebands of the Standard Frequency channels.

In explanation of the Appendix to Doc. IUCAF/94, Dr. Rawer described the difficulties national administrations experience in protecting frequencies used in space research for short-term observations in telemetry and the study of wave propagation. The frequencies mentioned in the Cospar resolution are of particular interest for Doppler measurements and for observations on the Faraday effect.

Dr. Hagen suggested that as a preliminary step, a small working party should prepare a draft of a new question on the need for further frequencies to be allotted for space research. Such a question could be established within CCIR, by correspondence if necessary, if it is supported by 20 national administrations. It was appreciated that two frequencies near 40 Mc/s, were of particular interest for studies of Doppler effect; but the guard bands at the standard frequencies of 2.5, 5, 15 and 25 Mc/s must still be protected for radio astronomy.

4. — *Working party to draft a CCIR Question.*

Following the proposal in section 3 above, a working party comprising Drs Hagen, Rawer and Smith-Rose was established. They met on 13th September and drafted the proposed CCIR question which is reproduced in the Appendix to this document, for further discussion by all members of IUCAF.

5. — *Frequencies for Radio Astronomy.*

Dr. Swenson remarked that in the United States; radio astronomers may abandon their attempts to keep these guard bands protected; but it was realised that the pattern of future experimental research in this field is changing; and the Chairman insisted that the Commission must take a long-term view in these matters.

It was pointed out, however, that it may be advantageous for radio astronomers to press for a single band of frequencies in the region of 15 Mc/s $\pm$ 3 Mc/s, and of a bandwidth of 100 kc/s; and then relinquish its present claim to the use of the sidebands at the 2.5,5 and 25 Mc/s standard frequencies.

It was agreed to ask Mr. Horner to explore this possibility and the action to be taken with the IFRB and ITU. The views of scientists using the time signal service on these frequencies should be taken into account.

6. — *The Deuterium Line* (322-329 *Mc/s*).

The Chairman remarked that it was unlikely that radiation from Deuterium would be detected in the band 322-329 Mc/s, while this was part of a larger band used for various signalling purposes. He suggested that radio astronomers should press for the use of this band as part of their approximate harmonic series (150, 300, 600, 1400 — etc). If it seemed likely that over a period of years the band 322-329 Mc/s, or a substantial part of it, could become available for radio astronomy, then it might be possible to consider abandoning the use of the band 406-410 Mc/s which is at present assigned to Radio Astronomy in Regions 1 and 3 (and 404-410 Mc/s in Region 3).

It was agreed to take note of the views of CCIR and URSI on this matter, and to consider the most profitable manner in which NATO could be approached for discussion of the possibilities of assisting the radio astronomers.

7. — *Protection of the OH lines.*

With regard to observations by radio astronomers of natural radiation from OH molecules, the ITU Radio Conference of 1963 established protection in the form of a footnote to the frequency allocation tables. This is footnote No. 353A which reads as follows :

« In view of the successful detection of two spectral lines in the region of 1665 Mc/s and 1667 Mc/s by radio astronomers, administrations are urged to give all practicable protection in the band 1664.4-1668.4 Mc/s for future research in radio astronomy ».

Dr. Swenson stated that recent experience in the United States has shown the need for this band of 4 Mc/s to be extended to 10 Mc/s; and this had received the support of CCIR at its recent Plenary Assembly in Oslo.

This was noted and supported in Commission V (Radioastronomy) of URSI, and at its General Assembly in Munich (September 1966), a resolution was adopted emphasising the need for extending the protection of observations of the natural line radiation from the OH radical to include appropriate bands at approximately 1612.2 and 1720.5 Mc/s.

With this encouraging support from both URSI and CCIR, it was agreed to take all practicable steps to seek additional protection from interference for all radioastronomy observations in this part of the spectrum.

8. — *Co-operation with ESRO.*

Following a discussion initiated by Dr. Sterky, it was decided to establish a closer relationship with the European Space Research Organization (ESRO). Mr. Horner said that he had been pressing ESRO to consider some of the problems of IUCAF; and Dr. Rawer stated that ESRO already negotiates with some national administrations on frequency allocation matters in space research.

It was decided to establih a closer and more formal contact with ESRO, and invite the technical director — Dr. Lines — to describe their arrangements for allocation of frequencies in space research projects, and offering the assistance of IUCAF in this matter.

9. — *Next meeting.*

Dr. Hagen renewed his invitation to hold the next meeting of the Inter-Union Commission in the United States. It was suggested

that a suitable place and time would be Greenbank or Washington in May, 1967. Dr. Sterky said he had to attend an international meeting in Montreal during the period 13th-20th May; and a two-day meeting before or after this would be very convenient to him. It was agreed to leave the matter with Dr. Hagen, who would make a more specific proposal in due course.

26th October 1966.

Appendix

Draft Question on the need for the allocation of additional frequencies for Space Research.

Considering that :

(*a*) Satellite radio beacons operating on two or more fixed, harmonically related, frequencies now provide a powerful technique for enhancing our knowledge of ionospheric conditions relevant to space research;

(*b*) Radio methods of geodetic measurements provide for the determination to a high degree of

  (*a*) orbital elements of satellites, and

  (*b*) terrestrial distances particularly for intercontinental ranges over large oceans;

(*c*) Studies are desirable in the field of radio propagation with the object of enhancing our knowledge of the transmision of radio waves at frequencies near the lower limit of frequency imposed by the ionosphere;

It is desirable that the following Questions should be studied :

1. In what regions of the spectrum should;

(*a*) radio wave propagation studies be carried out with the aid of space vehicles?

(*b*) ionospheric measurements be conducted with the aid of radio beacons?

(*c*) geodetic measurements be made using space vehicles carrying radio beacons ?

2. Which of the above applications would require long-term observations?

3. What specific relationships should exist between the various frequencies used for these applications?

4. What is the maximum interference that can be tolerated in each of these applications?

5. What are the factors affecting the sharing of the frequencies desired with other radio services?

6. What degree of co-ordination in the location of the ground stations will be required if frequency sharing is deemed to be practicable?

SCIENTIFIC COMMITTEE ON ANTARCTIC RESEARCH

SCAR

SCAR Manual 1966

The Scientific Committee on Antarctic Research has issued the SCAR Manual for 1966.

We quote from the scientific investigations recommended by SCAR :

« UPPER ATMOSPHERE PHYSICS.

IONOSPHERE.

(*a*) Vertical incidence sounding. The programme should follow the principles suggested in the 1958 Edinburgh report of the URSI-AGI Committee. At least two stations on the Antarctic continent should be Class F (full) and the remainder should be Class P(patrol) stations and as many as possible should be continued for at least another half solar cycle.

(*b*) Special observations. (1) Measurements of atmospheric radio noise should be continued for a full solar cycle at a minimum of two stations. (2) Special studies should be made on whistlers and very low frequency emissions, absorption and scatter and low-level echoes which may be peculiar to the southern auroral zone or polar cap. These studies should be co-ordinated with special studies in other disciplines concerning the high atmosphere ».

Dr. F. J. Hewitt, Vice-President, CSIR, P. O. Box 395, Pretoria, is the representative of URSI on SCAR.

COSPAR

Information Bulletin

COSPAR Information Bulletin, n° 33, October 1966 contains a summarized report on the Ninth Meeting of COSPAR (Vienna, May 10-19, 1966), and a review of the Symposium on the Interactions between the Upper and Lower Layers of the Atmosphere (Vienna, May 3-7, 1966).

CCIR

Lettre envoyée à toutes les administrations ainsi qu'aux autres participants aux travaux du CCIR

par le Dr L. W. HAYES,
Directeur intérimaire

Monsieur,

Au moment où je vais prendre ma retraite et quitter le CCIR, après plus de dix-sept ans passés dans son Secrétariat, je tiens à remercier tous les Membres de l'UIT, les exploitations privées reconnues, membres du CCIR et les organisations internationales qui participent à nos travaux, de même que les organismes scientifiques ou industriels qui prennent part aux activités de nos Commissions d'études, de la confiance dont ils m'ont honoré et de leur participation croissante aux travaux du CCIR — ainsi qu'en a témoigné tout particulièrement la récente Assemblée plénière d'Oslo.

Il est certain que les radiocommunications, dans leur ensemble, ont bénéficié de ces travaux, si l'on en juge aux progrès accomplis dans ce domaine pendant cette période. Pour n'en citer que deux exemples, je rappellerai que nous avons vu les radiocommunications spatiales devenir un service d'exploitation alors qu'il y a dix-sept ans, ce n'était encore qu'un concept théorique. De même, la télévision en couleur, qui n'en était alors qu'au stade du laboratoire, fonctionne actuellement dans plusieurs pays et sera bientôt mise en service dans de nombreux autres. On ne peut que regretter que le CCIR n'ait pas obtenu jusqu'à présent un plein succès dans ses efforts en vue d'une normalisation internationale.

En plus de ces deux champs d'activité — qui retiennent surtout l'attention du grand public — les Commissions d'études du CCIR ont poursuivi avec succès leurs travaux pour l'amélioration des services existants, travaux traitant aussi bien du perfectionnement des équipements que des aspects théoriques des radiocommunications.

Je suis convaincu que vous garderez votre confiance au CCIR et que vous continuerez de collaborer avec son Secrétariat sous la direction de mon successeur, qui entrera en fonctions le 1er septembre 1966.

En prenant congé de vous, je vous adresse mes vœux sincères et mon cordial salut.

Leslie W. HAYES
Directeur intérimaire du CCIR

Letter sent to all administrations and other participants in the work of the CCIR

by Dr. L. W. HAYES,
Director ad interim

Dear Sir,

At the time of my retirement from the CCIR after more than 17 years in its Secretariat, I wish to take the opportunity to thank all Members of the ITU, Recognized Private Operating Agencies, Members of the CCIR, as well as the International Organizations participating in our work and the Scientific or Industrial Organizations taking part in the work of our Study Groups, for the confidence they have placed in me and for their continuously increasing participation in the work of the CCIR, as instanced particularly in the recent Plenary Assembly at Oslo.

It is evident that this work has been beneficial to the whole field of radiocommunications, as may be seen from the development over this period. To give but two instances, we have witnessed space communication become an operational service, although 17 years ago it was but a theoretical concept. Colour television, too, which was then only in the laboratory stage, is in operation in several countries and is on the brink of becoming a public service in many others. One can but regret that, so far, full success of international standardization was denied to the CCIR.

Aside from these developements, which are most in the public eye, the work within all CCIR Study Groups of improving existing services, both by studies of better equipment and all the theore-

tical aspects of radiocommunication, has gone on continuously and fruitfully.

I am convinced that your confidence in and collaboration with the CCIR Secretariat will continue under the Directorship of my successor, who takes up his office on 1 September 1966.

Hail and farewell !

Leslie W. HAYES,
Director ad interim, CCIR

UIT

Publications

— Graphique en couleurs indiquant la répartition des bandes de fréquence entre 10 kHz et 40 GHz.

L'UIT vient de publier ce graphique qui reflète l'état actuel de ce tableau, compte tenu des modifications introduites par la Conférence administrative extraordinaire des radiocommunications chargée d'attribuer des bandes de fréquences pour les radiocommunications spatiales (Genève 1963).

En raison des nombreuses modifications introduites dans la distribution des bandes de fréquences, avec la création de nouveaux services pour les communications spatiales, ainsi que de l'introduction de nombreuses nouvelles notes relatives au tableau, il est apparu que la présentation du Graphique sous forme de carte d'un format nécessairement plus grand que celui du graphique de 1959 présenterait de sérieux inconvénients.

Le nouveau Graphique se présente donc sous la forme d'un atlas comprenant cinq planches de 60,5 × 42 cm. Le titre et la carte des Régions figurent sur la page de couverture. Sur chaque page de droite est représentée une partie du spectre sous forme de bandes verticales symboliquement coloriées. Sur chaque page de gauche sont représentés en couleur les symboles des différents services avec leur signification et, également, les notes générales et celles relatives à la partie du spectre représentée sur la page de droite.

Il a été édité séparément en trois langues (française, anglaise et espagnole) et son prix de vente, par exemplaire, a été fixé à 14 francs suisses; ce prix comprend l'emballage et les frais de port pour envoi par la poste ordinaire dans le monde entier.

— Colour chart of frequency allocation from 10 kc/s to 40 Gc/s.

The ITU has issued that chart which embodies the various amendments made by the Extraordinary Administrative Radio Conference on allocation of frequency bands for space radio (Geneva, 1963), and reflects the existing state of affairs.

Considerable changes have been made in the apportionment of frequency bands; new services have been created for space communications, and the table now contains many new notes. If we remained faithfull to the lay-out used in 1959, the new Chart would inevitably be a great deal bigger than the old one, which would be very inconvenient.

The new Chart, therefore, takes the form of an atlas with five 60.5 × 42 cm plates. The title of the volume and a map showing the various Regions appear on the cover page. On each right-hand page appears part of the spectrum, in the form of vertical bands symbolically coloured. On each left-hand page appear, in colours, the symbols used for the various services, with their meanings, together with general notes and notes relating to that part of the spectrum shown on the corresponding right-hand page.

There are three separate editions (one in English, one in Spanish, and one in French), and the price per copy is 14 Swiss francs, which covers postage by ordinary mail to any address.

— Nomenclature des stations de radiorepérage et des stations effectuant des services spéciaux (Liste VI), 3e édition.

Selon les dispositions de l'article 20 du Règlement des radiocommunications (Genève, 1959), la présente Liste contient les parties suivantes :

— Préface.

— Partie A : Index alphabétique des stations.

— Partie B : Etats signalétiques des stations.

La Partie B se subdivise elle-même en onze sections, à savoir :

1. Stations radiogoniométriques.
2. Stations de radiophare.
3. Navires-stations océaniques.
4. Stations émettant des signaux pour l'étalonnage des goniomètres.
5. Stations émettant des signaux horaires.
6. Stations émettant des fréquences étalon.
7. Stations émettant des bulletins météorologiques réguliers.
8. Stations émettant des avis aux navigateurs.
9. Stations émettant des avis médicaux.
10. Stations émettant des bulletins épidémiologiques.
11. Stations émettant des Ursigrammes.

La 3e édition de la Nomenclature des stations de radiorepérage et des stations effectuant des services spéciaux a été publiée séparément en français et en anglais. Le prix de vente d'un exemplaire, qui compte environ 630 pages, a été fixé à 19 francs suisses pour l'édition en langue française et à 12,50 francs suisses pour l'édition en langue anglaise; ces prix comprennent les frais de port pour envoi par la poste ordinaire dans le monde entier, l'emballage et l'abonnement aux suppléments récapitulatifs semestriels qui paraîtront jusqu'à la prochaine édition.

— List of Radiodeterminations and Special Service Stations (List VI), 3rd edition.

In accordance with Article 20 of the Radio Regulations (Geneva, 1959), this List comprises the following parts :

— Preface.

— Part A : Alphabetical index of stations.
— Part B : Particulars of stations.

Part B is subdivided into the following eleven sections :

1. Direction-finding stations.
2. Radiobeacon stations.
3. Ocean-station vessels.
4. Direction-finder calibration stations.
5. Stations transmitting time signals.
6. Stations transmitting standard frequencies.
7. Stations transmitting regular meteorological bulletins.
8. Stations transmitting notices to navigators.
9. Stations transmitting medical advice.
10. Stations transmitting epidemiological bulletins.
11. Stations transmitting Ursigrams.

The 3rd edition of the List has been issued in English and French versions. The price per copy, comprising about 630 pages, has been fixed at 19 Swiss francs for the French edition and 12,50 Swiss francs for the English edition, including the cost of packing and postage by surface mail to any part of the world, and the subscription for the recapitulatory supplements which will be issued every six months until the next edition.

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This report contains a compilation of solar radio data and brief descriptions of special investigations made during the IQSY at the radio astronomy department of the Heinrich-Hertz-Institute of the German Academy of Sciences at Berlin.

In the first part of the volume there are listed data of flux measurements at single wavelengths in the cm- and lower dm-range. Daily means of

observed radio flux at 3.2, 10, 15 and 20 cm wavelength (9400, 3000, 2000 and 1500 MHz) as well as the adjusted values for a constant distance between sun and earth of one Astronomical Unit are presented here. Further the editors have assembled the few burst data available for the period of the IQSY as a continuation of a report which previously appeared under the title « Radiostrahlungsausbrüche der Sonne im IGJ ».

During the last years, especially since the beginning of the IQSY, considerable attention has been devoted to questions of absolute calibration of the radio telescopes used. The solution of many problems such as the interpretation of the spectra of the quiet sun and the s-component, but also of bursts, depends on an accurate determination of the absolute radiation levels.

At the Heinrich-Hertz-Institute Berlin-Adlershof two methods have been employed for absolute calibrations of radiometers operating according to the Dicke-modulation principle at 3.2 and 20 cm wavelength. The second part of the volume deals with these absolute measurements. It contains also the result of a measurement of the solar flux at 54 cm wavelength using a comparison with the known spectrum of the radio source CAS A. Finally resulting spectra of the solar minimum flux and of the s-component are discussed.

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