

XIth General Assembly

Berkeley, USA

1961

XIe Assemblée Générale

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RESOLUTIONS ADOPTÉES

A. PAR L'ASSEMBLÉE GÉNÉRALE

SOMMAIRE DES DÉCISIONS CONTENUES DANS LE RAPPORT DE L'ASSEMBLÉE GÉNÉRALE

1. *Statuts et Règlements.* Le texte révisé des Statuts et Règlements, tel qu'il a été adopté, se trouve page 476, 6ème Partie.
2. *Structure des Commissions.* Une révision de la structure des Commissions a été adoptée.
3. *Admission de nouveaux Pays.* La décision prise par le Comité Exécutif d'admettre Taiwan comme pays adhérent a été confirmée. Il a été annoncé que le Comité Exécutif avait également décidé d'admettre le Brésil, la Corée du Nord, et la Turquie.
4. *Le Service International des Latitudes.* La résolution soumise par l'Union Géodésique et Géophysique Internationale a été adoptée. Il a été noté que le Comité Exécutif avait accepté l'offre faite par le Conseil Scientifique du Japon d'installer le Bureau Central à Mizusawa sous la direction de M. T. Hattori.
5. *Unité de Cotisation.* Il a été décidé de porter l'unité de cotisation pour les années 1962, 1963 et 1964 de 500 à 600 francs-or.
6. *Budget des Dépenses.* En acceptant le Budget, tel qu'il a été proposé par le Comité des Finances (voir page 39), l'Assemblée Générale a approuvé celles des résolutions financières issues des Commissions, pour lesquelles un financement est prévu. Ces résolutions ne sont pas reproduites ici.
7. *Comité Financier Consultatif.* Il a été décidé de mettre fin à l'existence de ce Comité.
8. *Commissions et Sous-Commissions.* Les décisions suivantes ont été prises:
 - (a) la Commission 3 (Notations) est dissoute;
 - (b) la Commission 14 prend le nouveau nom de "Commission sur les Données spectroscopiques fondamentales";
 - (c) la Commission 28 prend le nouveau nom de "Commission des Galaxies";
 - (d) la Sous-Commission 29a devient la Commission 36 sur "La Théorie des Atmosphères stellaires";
 - (e) toutes les autres Sous-Commissions deviennent des Comités ou des Groupes de Travail de leur Commission principale.

RESOLUTIONS ADOPTED

A. BY THE GENERAL ASSEMBLY

SUMMARY OF DECISIONS CONTAINED IN THE REPORT OF THE GENERAL ASSEMBLY

1. *Statutes and By-laws.* The revised Statutes and By-laws, as adopted, are printed on pages 477 in Part 6.
2. *Structure of Commissions.* A revised structure was adopted for Commissions.
3. *Admission of Countries.* The action of the Executive Committee in admitting Taiwan as an Adhering Country was confirmed. It was announced that the Executive Committee had also admitted: Brazil, North Korea, and Turkey.
4. *The International Latitude Service.* The resolution submitted by the International Union of Geodesy and Geophysics was adopted. It was noted that the Executive Committee had accepted the offer from the Science Council of Japan to set up the Central Bureau at Mizusawa under the directorship of Dr. T. Hattori.
5. *The Unit of Contribution.* It was agreed to increase the unit of contribution for the years 1962, 1963 and 1964 from 500 to 600 gold francs.
6. *Budget of Expenditure.* In accepting the Budget, as proposed by the Finance Committee (see page 39), the General Assembly approved those financial resolutions from Commissions for which provision is made. These resolutions are not repeated here.
7. *Advisory Finance Committee.* It was agreed to discontinue this committee.
8. *Commissions and Sub-Commissions.* It was agreed that:
 - (a) Commission 3 (Notations) be dissolved;
 - (b) Commission 14 be renamed "Commission on Fundamental Spectroscopic Data";
 - (c) Commission 28 be renamed "Commission on Galaxies";
 - (d) Sub-Commission 29 a become Commission 36 on "The Theory of Stellar Atmospheres";
 - (e) All other Sub-Commissions become Committees or Working Parties of their main Commissions.

Resolution No. 1

Proposed by the Executive Committee/Proposée par le Comité Exécutif

Viewing with great concern the grave danger that some future space projects might seriously interfere with astronomical observations in the optical as well as in the radio domain,

and *believing* that a degree of contamination of space which at the present time would be hardly detectable, might, if long-lived, well be disastrous to future observations with improved techniques,

and *maintaining* that no group has the right to change the Earth's environment in any significant way without full international study and agreement;

the International Astronomical Union *gives* clear warning of the grave moral and material consequences which could stem from a disregard of the future of astronomical progress,

and *appeals* to all Governments concerned with launching space experiments which could possibly affect astronomical research to consult with the International Astronomical Union before undertaking such experiments and to refrain from launching until it is established beyond doubt that no damage will be done to astronomical research.

Considérant avec une grande inquiétude certains projets de recherches spatiales qui pourraient compromettre sérieusement les observations astronomiques aussi bien optiques que radio-électriques,

persuadée qu'un degré de pollution de l'espace, à peine décelable actuellement, pourrait, s'il était durable, se révéler un jour désastreux pour les observations utilisant des techniques perfectionnées,

affirmant qu'aucune collectivité n'a le droit de modifier sensiblement l'espace au voisinage de la Terre, sans un accord international fondé sur une enquête approfondie,

l'Union Astronomique Internationale *insiste* tout particulièrement pour que soient pris en considération les progrès futurs de l'astronomie, qu'il y aurait de graves inconvénients moraux et matériels à perdre de vue,

et *demande* instamment à tous les gouvernements engagés dans les expériences spatiales qui pourraient affecter la recherche astronomique, de prendre l'avis de l'Union Astronomique Internationale avant d'entreprendre de telles expériences et de ne procéder à aucun lancement sans qu'il soit établi d'une manière irréfutable qu'aucun dommage ne peut en résulter pour la recherche astronomique.

Resolution No. 2

Proposed by the Executive Committee/Proposée par le Comité Exécutif

The International Astronomical Union expresses its appreciation that the plans for Project West Ford have been publicly announced well ahead of proposed launching and of the United States Government's official policy* that further launchings will be guided by the principle that such projects shall not be undertaken unless sufficient safeguards have been obtained against harmful interference with astronomical observations.

Nevertheless the International Astronomical Union views with the utmost concern the possibility that the band of dipoles proposed in Project West Ford might be long-lived, and it is completely opposed to the experiment until the question of permanence is clearly settled in published scientific papers with adequate time being allowed for their study. The International Astronomical Union is opposed to any experiment which might hamper future developments in astronomy.

If a short lifetime for the dipoles and the harmless nature of the experiment can be assured, and if Project West Ford is carried out, the International Astronomical Union regards it as essential that the fullest observations of, and experiments on, the properties and behaviour of the band of dipoles be carried out by all possible means. The observations and experiments should be performed and analysed according to the highest scientific standards and with the best equipment available, bearing in mind that signals which are barely, or not, detectable today will probably cause serious interference with future scientific research because of the development of more sensitive equipment.

The observations and experiments to be made on West Ford are likely to be difficult to perform, and will, in many ways, be similar to those carried out by the authorities responsible for operating West Ford. Moreover, much specific information such as precise and up-to-date ephemerides will be required. The International Astronomical Union will attempt to arrange for rapid and full co-operation among astronomers making observations and calculations, and to provide for world-wide dissemination of their results conforming to accepted standards of scientific research.

The International Astronomical Union welcomes the position* taken by the Government of the United States that any decision on later experiments of the West Ford type will be taken in the light of the results obtained from the presently proposed experiment. To enable the International Astronomical Union to obtain the necessary data, it requests the Government of the United States to grant full privileges to a group of astronomers, acceptable both to the Government and to the Union, to co-operate with West Ford authorities in performing quantitative experiments to determine the properties of the proposed belt of dipoles, its changes with time and location, and its impact upon present and future astronomical research.

* Letter of August 11, 1961, from Dr. J. B. Wiesner to Dr. L. V. Berkner

Resolution No. 2

Proposed by the Executive Committee/Proposée par le Comité Exécutif

L'Union Astronomique Internationale constate avec satisfaction que les plans du projet West Ford ont été annoncés publiquement bien avant l'époque du lancement projeté et que, selon les intentions officielles* du Gouvernement des Etats-Unis, au sujet des expériences suivantes, de tels projets ne seront pas entrepris sans que des assurances suffisantes aient été obtenues qu'elles ne compromettent pas gravement les observations astronomiques.

Cependant, l'Union Astronomique Internationale considère avec la plus grande inquiétude le cas où la ceinture de dipôles qui fait l'objet du projet West Ford serait de longue durée et reste résolument opposée à cette expérience jusqu'à ce que le problème de la permanence ait été clairement exposé dans des publications scientifiques, un délai suffisant étant laissé pour son étude. L'Union Astronomique Internationale reste opposée aux expériences qui pourraient empêtrer les développements futurs dans l'astronomie.

S'il peut être prouvé que les dipôles auront une vie courte et que l'expérience ne présente aucun inconvénient, et si l'expérience West Ford est entreprise, l'Union Astronomique Internationale considère comme essentiel que les observations et les expériences les plus complètes sur les propriétés et le comportement de la ceinture de dipôles soient entreprises par tous les moyens possibles. Ces observations et ces expériences devront être exécutées et analysées au niveau scientifique le plus élevé et avec le meilleur équipement disponible, en considérant que des signaux à peine, ou non, décelables aujourd'hui pourraient compromettre gravement les recherches entreprises dans la suite avec des moyens de sensibilité accrue.

Il est probable que ces observations et ces expériences seront difficiles à exécuter, et seront à maints égards identiques à celles que les autorités responsables du projet entreprendront à l'occasion de l'opération West Ford. En outre, beaucoup de données, telles que des éphémérides précises et tenues à jour, seront nécessaires. L'Union Astronomique Internationale s'efforcera d'organiser une coopération rapide et efficace entre les observateurs et les calculateurs, et d'assurer la diffusion mondiale de leurs résultats conformément à l'usage en matière de recherche scientifique.

L'Union Astronomique Internationale apprend avec satisfaction que les décisions* du Gouvernement des Etats-Unis, relatives aux expériences ultérieures du type West Ford, seront prises à la lumière des résultats de l'expérience actuellement en projet. Pour lui permettre de réunir les données nécessaires, l'Union Astronomique Internationale prie le Gouvernement des Etats-Unis de donner tous pouvoirs à un groupe d'astronomes agréé à la fois par le Gouvernement et par l'Union, pour coopérer avec les autorités West Ford en vue de déterminer par des expériences quantitatives les propriétés de la ceinture de dipôles, ses variations dans le temps et l'espace, et ses répercussions sur les recherches astronomiques présentes et futures.

* Lettre du 11 août 1961, du Dr. J. B. Wiesner au Dr. L. V. Berkner

Resolution No. 3

Submitted by IUGG and proposed by Commission 19/Soumise par l'IUGG et proposée par la Commission 19

L'Union Géodésique et Géophysique Internationale

Recommande

- (1) qu'un accroissement des ressources financières du Bureau Central du Service International des Latitudes (SIL) soit fait,
- (2) que les Stations du Service des Latitudes de l'hémisphère Nord continuent leur activité avec les instruments actuels et en apportant quelques améliorations à leur équipement, parce que la nécessité de coordonnées précises du pôle, à la fois pour les buts astronomiques et géodésiques, est plus grande que jamais,
- (3) que le SIL soit réorganisé en un Service International du Mouvement du Pôle, qui utilisera à la fois les observations d'heure et de latitudes faites aussi bien dans les stations indépendantes que dans celles du SIL,
- (4) qu'un groupe de travail restreint soit créé initialement pour établir un plan définitif pour l'organisation de la coopération internationale dans l'étude du mouvement du pôle et ensuite pour diriger le travail dans l'avenir. Le groupe devra soumettre à l'UAI des recommandations concernant l'emplacement futur du Bureau Central du SIL (à devenir SIMP),
- (5) que l'on publie les coordonnées du pôle sous la forme
$$x = x_0 + x_1, \quad y = y_0 + y_1$$
où x et y sont les coordonnées du pôle calculées à partir de latitudes moyennes initiales fixes, et x_1 et y_1 sont les coordonnées calculées à partir de la latitude moyenne de l'époque. Les coordonnées du pôle moyen de l'époque sont x_0 et y_0 .
- (6) que les résultats obtenus avec les instruments du SIL et avec les instruments indépendants soient publiés en détail aussitôt que possible,
- (7) que les problèmes suivants soient pris en considération:
 - (a) réduction à un système uniforme et analyse soigneuse des données du SIL;
 - (b) élaboration de critères pour définir la précision des observations de latitude, et comparaison, sur la base de ces critères, des observations faites avec les différents instruments,
- (8) que le champ de densité de l'atmosphère en altitude soit étudié au-dessus de chaque station, pour fixer l'ordre de grandeur des réfractions accidentelles, et qu'au moins une telle étude soit faite lors du choix d'un emplacement nouveau,
- (9) que par des mesures appropriées l'équilibre de température entre l'instrument et l'air de l'abri soit assuré, et que les propriétés intrinsèques de l'instrument, pour en dépister les défauts optiques ou mécaniques, soient étudiées,
- (10) que l'on procède à une étude de détail du champ de pesanteur local, pour en déceler les anomalies éventuelles, chaque fois qu'on aura quelque raison de suspecter des variations anormales de la verticale. Une telle prospection serait utile lorsqu'on se propose de créer une station nouvelle,
- (11) qu'un astrolabe soit installé à Mizusawa,

- (12) que l'Observatoire de Quito mette en service l'astrolabe qui y a été envoyé et que l'Observatoire entreprenne la détermination de l'heure et de la latitude et l'observation d'étoiles fondamentales,
- (13) que deux autres astrolabes soient installés dans l'hémisphère Sud, pour l'étude du mouvement du pôle, de préférence dans des observatoires déjà équipés d'instruments d'astronomie de position, et encourage le projet de l'Observatoire National du Chili d'installer un de ces appareils à Santiago,
- (14) que l'Observatoire de La Plata installe un PZT sur la même latitude que celle de Mount Stromlo,

note

avec satisfaction l'assurance donnée par le Professeur Cassinis que l'activité de la station de latitude de Carloforte continuera, et souligne l'importance de cette station,

et recommande

que l'Union Astronomique Internationale considère l'adoption de cette résolution.

The International Union of Geodesy and Geophysics:

Recommends

- (1) that an increase be made in the financial resources of the Central Bureau of the International Latitude Service (ILS),
- (2) that the northern ILS stations should continue in operation with the present instruments, and with some improvement in their equipment, due to the fact that the need for accurate polar co-ordinates for both astronomical and geophysical purposes is greater than ever before,
- (3) that the ILS be reorganized into an International Polar Motion Service utilizing both time and latitude observations made at both independent and ILS stations,
- (4) that a small working group be created initially to establish a definite plan for the organization of international co-operation in the study of polar motion and then to direct the work in the future. The group should submit to the IAU recommendations concerning the future location of the Central Bureau of the ILS (to become IPMS),
- (5) that the co-ordinates of the pole shall be given in the following forms:

$$x = x_0 + x_1, \quad y = y_0 + y_1,$$

where x and y are computed using fixed initial latitudes and x_1 and y_1 are computed using the mean latitude of epoch. The co-ordinates of the mean pole of epoch are x_0 and y_0 .

- (6) that results obtained with the ILS and independent instruments should be published in detail as soon as practicable,
- (7) that the following problems should be investigated further:
 - (a) reduction to a uniform system, and careful analysis of the data of the ILS,
 - (b) elaboration of criteria for the precision of latitude observations and comparison, by means of these criteria, of observations made with different instruments,

- (8) that the density field in altitude of the atmosphere above each station should be studied in order to fix the order of magnitude of accidental refraction, and that as a minimum one such study be made when choosing a new location,
- (9) that the necessary measures be taken to assure equilibrium in temperature between an instrument and the air of the shelter, and that the intrinsic properties of the instrument should be studied to avoid optical and mechanical faults,
- (10) that a detailed study of the local gravity field should be made to reveal the anomalies whenever there are reasons to suspect abnormal variations of the vertical. Such a study would be useful when a new station is created,
- (11) that an astrolabe be installed at Mizusawa,
- (12) that the Observatory of Quito should place in service the astrolabe that has been sent there, and that the Observatory should undertake the determination of time and latitude and the observations of fundamental stars,
- (13) that two other astrolobes should be installed in the southern hemisphere for the study of polar motion, preferably in observatories already equipped with position-measuring instruments, and heartily endorses the plan of the National Chilean Observatory to install an astrolabe in Santiago,
- (14) that the La Plata Observatory establish a PZT at the same latitude as that of Mount Stromlo,

notes

with satisfaction the assurance given by Professor Cassinis that the activity of Carloforte latitude station will be continued, and stresses the importance of this station,

and *recommends*

that the International Astronomical Union consider the adoption of this Resolution.

Resolution No. 4

Proposed by Commission 14/Proposée par la Commission 14

Considering that the angstrom is equal to 10^{-10} meter with an accuracy as great as that with which it has been realized in terms of the red line of cadmium and that, on the other hand, the meter now is defined with a great accuracy in terms of the $2p_{10}-5d_5$ radiation of krypton 86

the General Assembly *decides*, subject to agreement by the other Unions represented in the Triple Commission for Spectroscopy, that

- (1) the angstrom is defined as being equal to 10^{-10} meter,
- (2) the definition of the angstrom in force since 1907 based on the red line of cadmium is revoked.

Considérant que l'angström est égal à 10^{-10} mètre avec une précision aussi grande que celle avec laquelle il a été réalisé par la raie rouge du cadmium, et que, d'autre part, le mètre est maintenant défini avec une plus grande précision par la radiation $2p_{10}-5d_5$ du krypton 86

l'Assemblée générale *décide*, pour autant que les autres Unions représentées dans la Commission Triple de Spectroscopie soient d'accord, que

- (1) l'angström est défini comme étant égal à 10^{-10} mètre,
- (2) la définition de l'angström en vigueur depuis 1907, fondée sur la raie rouge du cadmium, est abrogée.

Resolution No. 5

Proposed by the Executive Committee/Proposée par le Comité Exécutif

Considering the impracticability of giving individual attention to every resolution adopted by each of its 58 Commissions and Sub-Commissions, and having full confidence in its Commissions,

this General Assembly wishes to give its *endorsement* to the resolutions adopted by its individual Commissions,

and *recommends* that astronomers give effect to these resolutions in so far as they are able.

Considérant qu'il est impossible d'accorder un examen particulier à chaque résolution adoptée par chacune des 58 Commissions et Sous-Commissions, et ayant pleine confiance dans ses Commissions,

cette Assemblée générale désire donner *son accord* aux résolutions adoptées par ses Commissions individuelles,

et *recommande* que les astronomes les rendent effectives dans toute la mesure de leurs possibilités.

RESOLUTIONS

B. BY COMMISSIONS AND SUB-COMMISSIONS

Of the Resolutions and Recommendations adopted by Commissions and Sub-Commissions only those of wide interest and appeal are repeated here; the others may be found in the Reports of Meetings to which reference is made. The numbers of the Resolutions, where given, are those used in the Reports.

RESOLUTIONS

B. PAR LES COMMISSIONS ET SOUS-COMMISSIONS

Parmi les résolutions et recommandations adoptées par les Commissions et Sous-Commissions, seules sont reproduites ici celles qui présentent un vaste intérêt et s'adressent à une large audience; les autres peuvent être trouvées dans les Comptes-Rendus de réunions, auxquels nous renvoyons. Là où ils sont donnés, les numéros des résolutions sont ceux utilisés dans les Comptes-Rendus.

Commission 4 (Ephemerides)/Ephémérides)

Commission 4—see page 167. (See also Commission 31.)

2. The provisional value of ephemeris time that is obtained by comparing the Moon's mean longitude, given by observations, referred to the equinox of FK 4, with the positions tabulated in the *Improved Lunar Ephemeris* is denoted by E.T.O. The difference E.T.O.—U.T.2 is denoted by ΔT_0 .

Commission 4—voir page 167. (Voir aussi Commission 31.)

2. La valeur provisoire du temps des éphémérides, obtenue en comparant la longitude moyenne de la Lune résultant d'observations rapportées à l'équinoxe du FK 4, avec les positions données par l'*Improved Lunar Ephemeris* est appelée T.E.O. La différence T.E.O.—T.U.2 est appelée ΔT_0 .

RECOMMENDATIONS

1. It is recommended that, upon completion, Clemence's new theory of the motion of the Earth be adopted as the basis for the published national ephemerides.

Il est recommandé que, lorsque la nouvelle théorie du mouvement de la Terre par Clemence sera terminée, celle-ci soit adoptée comme base pour les publications des éphémérides nationales.

2. The provisional value of ephemeris time that is obtained by comparing the Moon's mean longitude, given by observations, referred to the equinox of FK 4, with the positions tabulated in the *Improved Lunar Ephemeris* be denoted by E.T.O. The difference E.T.O.—U.T.2 is denoted by ΔT_0 .

La valeur provisoire du temps des éphémérides, obtenue en comparant la longitude moyenne de la Lune résultant d'observations rapportées à l'équinoxe du FK 4, avec les positions données par l'*Improved Lunar Ephemeris* est appelée T.E. o. La différence T.E. o — T.U. 2 est appelée ΔT_0 .

3. It is recommended that mean and apparent places of fundamental stars published in national ephemerides shall be based on FK 4 as soon as this is technically possible.

Il est recommandé que les positions moyennes et apparentes des étoiles fondamentales qui sont publiées dans les éphémérides nationales, soient basées sur le FK 4 aussitôt que ce sera faisable.

Commission 5 (Abstracts and Bibliography/Analyses de Travaux et de Bibliographie)

Commission 5—see page 169

Concerning the proposed new edition of *Les Observatoires astronomiques et les Astronomes*, Commission 5 intends to form a Working Group, consisting of the President of the Commission, Professor P. Bourgeois and Dr G. Z. Dimitroff, to co-ordinate as efficaciously as possible the efforts of all working in this field. It calls on the General Secretary of the Union to request representatives from different countries to make themselves responsible for the assembly and verification of the necessary data.

Commission 5 reminds all observatories and institutions which publish astronomical works that they have been requested to send regularly two copies of each publication to the editors of the *Referativny Journal* (Moscow), of the *Astronomischer Jahresbericht* (Heidelberg), and of the *Bulletin signalétique du CNRS* (Paris), in order to facilitate the preparation of these bibliographical periodicals and to ensure an exhaustive analysis of existing publications.

Commission 5—voir page 169

Au sujet de la réédition du répertoire *Les Observatoires astronomiques et les Astronomes*, la Commission 5 propose de former un groupe de travail composé du Président de la Commission 5 et de MM. Bourgeois et Dimitroff pour coordonner aussi efficacement que possible les efforts de tous ceux qui travaillent dans ce domaine. La Commission 5 prie le Secrétaire Général de l'Union d'adresser aux représentants des divers pays la demande de bien vouloir se charger de rassembler et de vérifier les données nécessaires.

La Commission 5 rappelle à tous les observatoires et toutes les institutions qui publient des travaux astronomiques qu'ils sont priés d'envoyer régulièrement deux exemplaires de leurs travaux à la direction du *Referativny Journal* (Moscou), de l'*Astronomischer Jahresbericht* (Heidelberg), et du *Bulletin signalétique du CNRS* (Paris), afin de faciliter les travaux de ces revues bibliographiques et de leur permettre une analyse exhaustive des publications existantes.

7^e point: *Les observatoires astronomiques et les astronomes*. En l'absence du Dr G. Dimitroff, qui se serait occupé d'une nouvelle édition de ce répertoire, M. Bourgeois fait ressortir qu'il s'agit ici d'un travail très long, très coûteux et aussi très ingrat, les observatoires ne répondant que difficilement au questionnaire qui leur est envoyé. On a rédigé un premier supplément, qui pourra être distribué prochainement. Si le Comité exécutif désire que ce Répertoire soit complété ou bien réédité sur une nouvelle base, il conviendrait d'en discuter dans une réunion restreinte. Le Professeur Kourganoff propose que ce comité restreint, ou plutôt ce groupe de travail, comme le Président voudrait le nommer, serait composé du président de la Commission 5 et de MM. Bourgeois, Dimitroff et Kourganoff.

Sur la proposition du Dr Kulikovsky la Commission demandera au Secrétaire Général de l'Union de s'adresser aux représentants des divers pays pour qu'ils se chargent de rassembler les données nécessaires. M. Bourgeois suggère qu'on introduise une résolution dans ce sens au Comité exécutif.

Commission 7 (Celestial mechanics/Mécanique Céleste)

Commission 7 recommends a unified notation for the Earth's gravitational field; details are not repeated here.

La Commission 7 recommande l'emploi d'une notation unifiée pour le champ de gravitation terrestre (les détails ne sont pas donnés ici).

REPORT OF COMMITTEE ON NOTATIONS

Professor Hagihara then reported that the committee on notations, which had been appointed at the first meeting of the Commission, had met twice with Sir Harold Jeffreys, Chebotarev, Garfinkel, Kozai and himself present. The committee found it desirable to unify notations for the Earth's gravitational potential and recommended the following:

1. Axial symmetry

$$U = \frac{\mu}{r} \left[1 - \sum_{n=1}^{\infty} J_n \left(\frac{R}{r} \right)^n P_n (\sin \beta) \right]$$

2. General Case

$$U = \frac{\mu}{r} \left[1 + \sum_{n=1}^{\infty} \sum_{m=0}^n \left(\frac{R}{r} \right)^n P_n^m (\sin \beta) \{ C_{n,m} \cos m\lambda + S_{n,m} \sin m\lambda \} \right]$$

$$\text{where } P_n^m (x) = (1 - x^2)^{\frac{1}{2}m} \frac{d^m}{dx^m} P_n (x)$$

$$\text{and } \int_{-1}^{+1} \left[P_n^m (x) \right]^2 dt = \frac{2}{2n+1} \frac{(n+m)!}{(n-m)!}$$

3. Alternative Form

$$U = \frac{\mu}{r} \left[1 + \sum_{n=1}^{\infty} \sum_{m=0}^n \left(\frac{R}{r} \right)^n p_{n,m} (\sin \beta) \{ A_{n,m} \cos m\lambda + B_{n,m} \sin m\lambda \} \right]$$

$$\text{where } p_{n,m} (x) = \left(\frac{(n-m)!}{(n+m)!} \right)^{\frac{1}{2}} P_n^m (x)$$

4. Longitude be measured positive to the East.
5. Recommends the computation and circulation of tables of the quantities

$$P_n^m(x), \left(\frac{(n-m)!}{(n+m)!} \right)^{\frac{1}{2}} \quad n, m = 0, 1, 2, \dots 8$$

by the Smithsonian Astrophysical Observatory.

In all the above formulae, R represents the equatorial radius of the Earth.

The members of the Commission present agreed that the recommended notation did not pertain to the quantities μ , R , β .

In the discussion which ensued, Dr Herget asked why the expression in 2 does not degenerate to that in 1. Professor Hagihara replied that this form was retained to pay respect to former work in the field and Professor Brouwer added that the use of \mathfrak{J} has been standard for a long time. Dr Herget felt that by recommending this form, it would be perpetuated in the future. Dr Kovalevsky remarked that in this context longitude should be measured to the east only. Otherwise the possibilities of errors would be very large. Dr Herrick made the following suggestion:

$$C_{n,0} = -\mathfrak{J}_n = C_n$$

His recommendation was that the zero subscript be dropped in the coefficient $C_{n,0}$.

Herrick's suggestion was adopted followed by the adoption of the above recommendations of the committee,

Commission 8 (Positional Astronomy/L'Astronomie Position)

Commission 8—see page 178.

Commission 8—voir page 178.

RESOLUTIONS ADOPTED BY THE COMMISSION

1. Commission 8 has noted with great interest the virtual completion, since the last General Assembly, of the "Mirror Transit Circle" at the University of Oporto. This pioneering project has been carried through with great courage and perseverance, and the Commission expresses the most earnest hope that means may be found to subject the instrument to the necessary tests and to bring it into appropriate operation at a very early date.

2. Commission 8 notes with regret that although astrolabe observations are of recognized value for improving fundamental catalogues, particularly in the southern hemisphere, no practical effect has been given to the resolutions in favour of establishing a chain of astrolabes, which were adopted at the tenth General Assembly in Moscow and at the second Astrometric Conference in Cincinnati. The Commission repeats this recommendation once again.

3. In view of the fact that many astrolabe observations have not yet been discussed for the purpose of improving star-places, Commission 8 urges the authors in question either to undertake this analysis or to notify the Paris Observatory that they do not propose to do so; in the latter case the Commission understands that the Paris Observatory will itself undertake the work.

4. Commission 8 recommends that on the basis of the findings of the Working Group appointed to consider meridian observations of latitude stars, a sufficient number of observatories having meridian circles be urged to make the necessary number of observations.

5. Commission 8 recommends that: (a) the individual observations of the AGK 3R stars, and of the fundamental stars used in their reduction, be made available to the U.S. Naval Observatory, for the formation of a reference-star catalogue rigorously related to the system of the FK 4; (b) the individual observations thus collected at the U.S. Naval Observatory be made available by it to the Strasbourg and Pulkovo Observatories.

6. For the purpose of forming catalogues of the Southern Reference Stars, Commission 8 recommends: (a) that the individual observations of Reference Stars and Fundamental Stars in the zone 0° to -30° be made available to the U.S. Naval Observatory and that those in the zone -30° to -90° be made available to the Pulkovo Observatory; (b) that the U.S. Naval Observatory and the Pulkovo Observatory exchange as many of these observations as may be requested by either, to meet the requirements of their catalogues and to obtain a good connection with the AGK 3R catalogue.

7. Commission 8 recommends that the "Bright Star List", 0° to -90° , be observed during the Southern Reference Star programme.

Commission 10 (Solar Activity/L'Activité Solaire)

Commission 10—see page 189.

Commission 10, considering the wish expressed by the Comité International de Géophysique and other organizations for world-wide co-operation in geophysics, urges all observers active in the solar patrol to report promptly to the nearest Regional Warning Centre, by telegram or other available fast channel, all flare events of importance 1+ and greater, during the coming years of declining solar activity and especially during the International Year of the Quiet Sun (IYSY).

Commission 10—voir page 189.

La Commission 10, considérant le vœu exprimé par le Comité International de Géophysique et par d'autres organisations, d'une coopération mondiale en géophysique, demande avec insistance à tous les observateurs actifs dans la surveillance du Soleil de signaler rapidement au Centre d'Alerte Régional le plus proche (par télégramme ou par tout autre procédé rapide) toutes les éruptions d'importance 1+ (et plus importantes) pendant les prochaines périodes d'activité solaire en diminution, et spécialement pendant l'Année Internationale du Soleil Calme (AISC).

Following a discussion on the need for improvements in the estimation of flare importance the following resolution was adopted:

"That a Working Group be appointed to consider all problems concerned with the estimation of flare importance and to make recommendations which could be put into operation from 1 January 1965".

Members of the Working Group were appointed as follows: M. C. Ballario, A. Bruzek, H. Dodson-Prince (Chairman), E. E. Dubov, M. A. Ellison, R. Hedeman, J. V. Lincoln, R. Michard, Y. Öhman, H. J. Smith and C. Warwick. The Group was empowered to take earlier action if it found that discrepancies were arising between the estimations of different stations through the use of incorrect units or methods of measurement.

Commission 10 a (Cinematography/Cinematographie des Phenomenes Solaire)

Sub-Commission 10 a—see page 191.

The Sub-Commission notes with satisfaction the effectiveness of the co-operative solar flare patrols of the IGY and the IGC-1959, and the continued co-operation of many observing stations in voluntary cinematographic flare coverage and data centralization; the Sub-Commission also notes the increasing demand for accurate solar flare data and for patrol of other abrupt solar H α phenomena during the IQSY period, and through the solar activity minimum; the Sub-Commission therefore commends continued efforts towards complete flare and disk coverage on a co-operative international basis; the Sub-Commission notes in particular the importance of filling the major time gaps by further patrol coverage from China, the U.S.S.R., India, Latin America and Eastern North America; it further urges preparation by the World Data Centers of a full catalog of films available at co-operating stations.

The Sub-Commission recommends the preparation by the World Data Centers of a co-operative catalog of records of swept-frequency solar radio noise telescopes, covering all longitudes, and emphasizes the great importance to solar physics, space physics, and solar-terrestrial research of the widest possible international co-operation to assure full observational coverages.

Sous-Commission 10 a—voir page 191.

La Sous-Commission note avec satisfaction l'efficacité de la coopération dans la surveillance du Soleil, réalisée sous l'égide de l'AGI et du CIG-1959, et la collaboration continue de nombreuses stations d'observation pour une étude cinématographique exhaustive des éruptions et pour une centralisation des données. La Sous-Commission note aussi la demande accrue de données précises relatives aux éruptions solaires, et d'une surveillance des autres phénomènes à début brusque observables en H α , pendant la période de l'AISC et durant le minimum de l'activité solaire; la Sous-Commission recommande par suite la poursuite des efforts en vue d'une étude complète des éruptions et du disque, par une coopération internationale. La Sous-Commission note en particulier l'importance qu'il y a à combler les principaux temps morts grâce au renforcement de la surveillance continue exercée de Chine, d'U.R.S.S., d'Inde, d'Amérique Latine et des régions orientales de l'Amérique du Nord; elle recommande de plus la préparation par les Centres Mondiaux de Données d'un catalogue complet des films disponibles aux différentes stations.

La Sous-Commission recommande la préparation par les Centres Mondiaux de Données d'un catalogue, établi d'une façon coopérative, pour les enregistrements issus des radio-télescopes solaires à balayage de fréquence, couvrant tous les domaines de longitudes, et insiste sur la grande importance, pour la physique solaire, la physique spatiale et les recherches sur les relations Soleil-Terre, de la coopération internationale la plus large possible afin d'assurer le caractère exhaustif de l'ensemble des observations.

SPECIFIC RECOMMENDATIONS

The Sub-Commission then turned its attention to several specific recommendations. In addition to the recommendations mentioned in the Sub-Commission report, the members adopted, by unanimous vote, the following resolution:

"The Sub-Commission recommends the preparation by the World Data Centers of a co-operative catalog of records of swept-frequency solar radio noise telescopes, covering all longitudes, and emphasizes the great importance to solar physics, space physics, and solar-terrestrial research of the widest possible international co-operation to assure full observational coverage."

Commission 15 (Physical Study of Comets/Etude Physique des Comètes)

Commission 15—see page 228.

Commission 15—voir page 228.

Second meeting, 22 August 1961

At the beginning of the second meeting, which was to be devoted to a colloquium on "The Structure and Development of the Gas Tails of Comets", Dr Swings requested permission to present the following recommendation.

"Commission 15 recommends the study of Encke's Comet by a space probe at its next close approach; in mid-July 1964. Observations should be made of:

- (a) the nucleus (telescopic appearance, polarisation and color),
- (b) the head and the near tail (in density and composition, magnetic fields, total density of the neutral particles, plasma frequency, micrometeorites, far ultra-violet emission especially that of H₂ near $\lambda 1300$).

En route to the comet the probe would collect valuable information on the interplanetary space outside of the plane of the ecliptic".

There was general agreement that this recommendation should be brought to the knowledge of members of NASA, and discussed with them.

Commission 16 (Physical Study of the Planets/L'Etude Physiques des Planètes et des Satellites)

Commission 16—see page 234.

Commission 16 recommends conventions for use in compiling new maps of the Moon, and rules for the nomenclature of lunar features; details are not repeated here.

Commission 16—voir page 234.

La Commission 16 recommande l'adoption de conventions dans l'établissement de nouvelles cartes lunaires et de règles pour la nomenclature des différents détails lunaires (les détails ne sont pas reproduits ici).

RÉSOLUTION NO. I

"Pour l'établissement de nouvelles cartes de la Lune, il est recommandé de se conformer aux conventions suivantes:

(a) Les cartes *astronomiques* destinées aux observations télescopiques sont orientées selon les usages de l'astronomie avec le Sud en haut. Les termes Est et Ouest prêtent à confusion et doivent être supprimés.

(b) Les cartes *astronautiques* destinées aux explorations directes sont présentées selon les méthodes habituelles de la cartographie terrestre, avec le Nord en haut et l'Est à droite.

(c) Les altitudes et les distances sont données dans le système métrique."

English translation

"For compiling new maps of the Moon, the following conventions are recommended:

(a) *Astronomical* maps for purpose of telescopic observations are oriented according to the astronomical practice, the South being up. To remove confusion, the terms East and West are deleted.

(b) *Astronautical* maps, for direct exploration purposes, are printed in agreement with ordinary terrestrial mapping, North being up, East at right and West at left.

(c) Altitudes and distances are given in the Metric System."

RÉSOLUTION NO. 2

1. "Pour désigner les formations de la surface lunaire, il est recommandé de se conformer aux règles antérieures, revues et améliorées de la façon suivante:

(a) Les cratères et les cirques sont désignés par des noms d'astronomes ou de savants illustres décédés; ces noms sont écrits en lettres latines selon l'orthographe préconisée par le pays d'origine du savant nommé.

(b) Les chaînes d'aspect montagneux sont désignées en latin par des dénominations rappelant la géographie terrestre; ces noms sont accordés selon les règles de la déclinaison latine au substantif *Mons*. (Les trois exceptions Mons d'Alambert, Mons Harbinger, Mons Leibnitz sont conservées en raison d'un long usage).

(c) Les grandes étendues sombres sont désignées en latin par des dénominations évoquant des états psychiques; ces noms sont accordés selon les règles de la déclinaison latine à l'un des substantifs appropriés *Oceanus*, *Mare*, *Lacus*, *Palus* ou *Sinus*. (Les exceptions Mare Humboldianum et Mare Smythii sont conservées en raison d'un long usage).

(d) Les pics isolés sont désignés comme les cratères, ainsi que les promontoires, ces derniers étant précédés du substantif latin *Promontorium* (Exemple: Promontorium Laplace).

(e) Les rainures et vallées portent le nom du cratère le plus proche et sont précédées des substantifs latins *Rima* et *Vallis*. (L'exception Vallis Schröter est conservée).

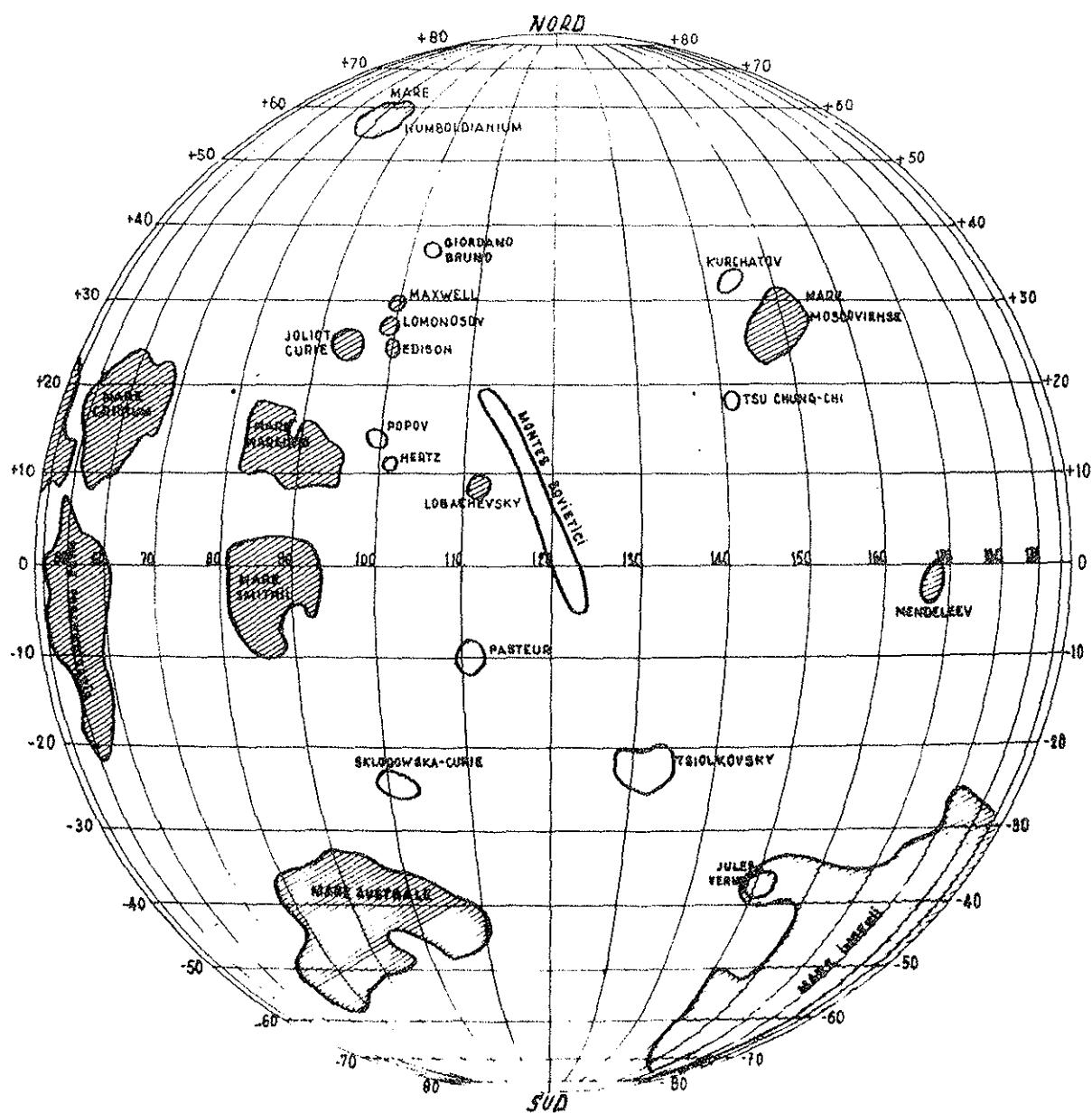
(f) Les formations non dénommées peuvent être désignées par leurs coordonnées. Elles peuvent également continuer à être désignées par le nom du cratère le plus proche suivi d'une lettre majuscule de l'alphabet latin pour les cratères, dépressions, vallées, d'une lettre minuscule de l'alphabet grec pour les collines, élévations, pics, d'un chiffre romain suivi de la lettre r (Ir, IIr, etc..) pour les rainures."

2. "Par suite, pour désigner les formations lunaires observables depuis la Terre, il est recommandé d'adopter la Nomenclature selon l'Union Astronomique Internationale (*Named Lunar Formations*, M. A. Blagg and K. Müller, London, 1935) revue et corrigée par la table III du *Photographic Lunar Atlas* (éditeur G. P. Kuiper, University of Chicago Press, 1960), de ne plus ajouter de nouvelles désignations, et d'appliquer les corrections orthographiques suivantes:

| | | |
|------------|-----------------|--------------|
| Condamine | doit être écrit | La Condamine |
| Lacaille | " " | La Caille |
| Lahire | " " | La Hire |
| Lapeyrouse | " " | La Pérouse |
| Legentil | " " | Le Gentil |
| Lemonnier | " " | Le Monnier |
| Leverrier | " " | Le Verrier |
| Régnault | " " | Regnault |

3. "Il est recommandé d'adopter, pour les formations de la surface lunaire non observables de la Terre, les désignations reportées dans *L'Atlas de la Face de la Lune opposée à la Terre* (Editeur N. P. Barabashov, A. A. Mikhailov et Y. N. Lipsky, Moscou 1960), sous la forme reportée dans le tableau suivant et la carte jointe.

| Désignation | n° du catalogue | longitude ° | latitude ° |
|------------------|-----------------|--------------------|---------------|
| Tsu Chung-Chi | 1 | 141 | + 18 |
| Kurchatov | 2 | 144 | + 32 |
| Jules Verne | 5 | 151 | - 37 |
| Mendeleev | 10 | 167 | - 2 |
| Popov | 71 | 99 | + 14 |
| Hertz | 74 | 101 | + 11 |
| Edison | 83 | 100 | + 24 |
| Lobachevsky | 88 | 112 | + 9 |
| Pasteur | 95 | 111 | - 10 |
| Sklodowska Curie | 112 | 102 | - 23 |
| Tsiolkovsky | 151 | 131 | - 22 |
| Lomonosov | 177 | 99 | + 28 |
| Joliot Curie | 183 | 93 | + 25 |
| Maxwell | 185 | 99 | + 30 |
| Giordano Bruno | 208 | 103 | + 36 |
| Montes Sovietici | 103 | (de 111 (à 124) | + 19 - 5 |
| Mare Ingenii | 150 | | |
| Mare Moscoviene | 152 | 149 | + 27 |



Commission 16, Résolution no. 2: Carte indiquant les désignations de la surface lunaire non observable de la Terre.

Commission 16, Resolution no. 2: Chart showing the recommended nomenclature for the surface

English translation

1. "For designating the lunar surface features, it is recommended that the previous rules be followed, revised and improved as follows:

(a) Craters and rings, or walled plains, are designated by the name of an astronomer or prominent scientist *deceased*, written in the Latin alphabet, and spelt according to the recommendation by the country of origin of the scientist named.

(b) Mountain-like chains are designated in Latin by denominations allied with our terrestrial geography. Names are associated with the substantive *Mons* according to the Latin declination rules and spelling. (Three exceptions, Mons d'Alembert, Mons Harbinger and Mons Leibnitz, are preserved due to long usage).

(c) Large dark areas are designated in Latin denominations calling up psychic states of minds. These names are associated, according to the Latin declination rules and spelling, to one of the appropriate substantives: *Oceanus*, *Mare*, *Lacus*, *Palus* or *Sinus*. (The exceptions, Mare Humboldianum and Mare Smythii, are preserved, due to long usage).

(d) Isolated peaks are designated according to the same rules as for the craters, as well as promontories, the latter being preceded by the Latin substantive *Promontorium*. (Example: Promontorium Laplace).

(e) Rifts and valleys take the name of the nearest designated crater, preceded by the Latin substantives *Rima* and *Vallis*. (The exception Vallis Schröter is preserved).

(f) Undenominated features can be designated by their co-ordinates. They can equally be designated according to the former classical system, by taking the name of the nearest crater, followed by an upper case letter of the latin alphabet for craters, depressions and valleys, by a lower case letter of the greek alphabet for hills, elevations and peaks, and by a roman number followed by the letter r (Ir, IIr, IIIr, etc..) for the clefts."

2. "Accordingly, for the designation of the lunar surface features observable from the Earth, it is recommended that the International Astronomical Union Nomenclature (published in *Named Lunar Formations* by M. A. Blagg and K. Müller, London, 1935), as corrected in table III of the *Photographic Lunar Atlas* (Editor G. P. Kuiper, University of Chicago Press, 1960), be adopted, that new names be avoided, and that the following orthographic corrections be applied:

| | | |
|------------|-----------------|--------------|
| Condamine | must be printed | La Condamine |
| Lacaille | " " | La Caille |
| Lahire | " " | La Hire |
| Lapeyrouse | " " | La Pérouse |
| Legentil | " " | Le Gentil |
| Lemonnier | " " | Le Monnier |
| Leverrier | " " | Le Verrier |
| Régnault | " " | Regnault |

3. "For the designation of the surface features on the reverse side of the Moon, it is recommended that the nomenclature reported in the *Atlas of the Far Side of the Moon* (Editors: N. P. Barabashov, A. A. Mikhailov and Y. N. Lipsky, Moscow 1960) be adopted, expressed in terms of the following table and the accompanying chart".

(Names are given in the table of the French version of the resolution, printed above.)

3. The committee appointed by Commission 16 on "International Collaboration for Planetary Observations" desires to facilitate international collaboration on planetary studies by the eventual establishment of at least two data centers, one in the United States and one in Europe; and meanwhile requests observatories having large collections of planetary photographs to make these available for such studies as require a full coverage in longitude.

3. Le comité de la Commission 16, "Coopération Internationale pour l'Observation des Planètes", désire faciliter cette coopération par l'établissement éventuel d'au moins deux centres de documentation, l'un aux Etats-Unis, l'autre en Europe; dans ce but il demande aux observatoires disposant de grandes collections de photographies planétaires de les rendre disponibles pour de telles études, vu la nécessité d'une répartition complète en longitude.

Commission 17 (Motion and Figure of the Moon/Mouvement et Figure de la Lune)

Z. Kopal gave a brief account of the proceedings of a conference on current problems of selenodesy and topography of the Moon, which was held at the Observatoire du Pic-du-Midi between 19 and 23 April 1960. Dr Jean Rösch, Director of the Observatoire du Pic-du-Midi, acted as chairman of a gathering which included Drs Camichel, Campen, Carder, Dollfus, Hunt, Kearns, Kopal, Koziel, Rackham, Ring, Schrutzka-Rechtenstamm and Weimer.

One of the main aims of this conference (the Proceedings of which, edited by Z. Kopal and E. B. Finlay, should shortly be available for distribution as an *Astronomical Contribution from the University of Manchester*, Series III, No. 90) has been to discuss the ways in which the existing systems of three-dimensional co-ordinates on the surface of the Moon could be improved in the near future. As a result of extensive discussions held on this occasion it was recommended:

(a) To reduce anew all past heliometric observations of the crater Mösting A with the aid of an electronic computer, in order to improve our present knowledge of the libration constants of the Moon. This task is to be undertaken shortly by Professor Koziel at the University of Manchester in England.

(b) To select a system of 100-200 lunar control points of second order, defined by the position of small craters (5-10 km in diameter) which are sufficiently shallow and geometrically well-defined to enable us to measure accurately their positions; and to employ the lunar plates taken with the Markowitz cameras during the IGY to determine the positions of such craters with respect to a fundamental frame of reference as represented by the neighbouring stars. This problem has since been under active investigation by Drs Weimer and Hunt.

(c) To use the shadows cast by the irregularities of the lunar surface in oblique illumination by the Sun for determination of relative heights above the osculating surface of the local mean selenoid (as defined by three or more adjacent points of second order). Extensive work along these lines has been in progress at the University of Manchester since 1958 (Professor Kopal and Mr Rackham), using photographic material secured at the Observatoire du Pic-du-Midi; and a comprehensive mathematical analysis of the problem is being published by Kopal in Chapter VII of the forthcoming compendium on *The Moon* (Academic Press, London and New York, 1961).

Commission 20 (Minor Planets, Comets and Satellites/Petites Planètes, Comètes et Satellites)

Commission 20—see page 262.

Commission 20—voir page 262.

The following resolutions were adopted:

Commission 20 recommends that the Minor Planet Center in Cincinnati continue issuing the Minor Planet Circulars, and that a sum of \$750.00 per annum be made available for defraying the necessary expenditures. [This resolution was approved, and incorporated in the report of the Finance Committee.]

Commission 20 wishes to stress the importance of the work of identifications of minor planets, especially as carried on with such great success by the late A. Patry, and recommends most strongly that this work should be continued.

Commission 21 (Light of the Night Sky/La Luminescence du Ciel)

Commission 21—see page 264.

Commission 21 urges that inactive all-sky cameras be set up at night-sky stations even in geomagnetic latitudes as low as 30 degrees. They should be put into operation on rare occasions when auroras are visible.

Commission 21—voir page 264.

La Commission 21 insiste pour que des chambres susceptibles d'étudier l'ensemble de la voûte céleste soient montées, sans fonctionner, dans toutes les stations d'étude du ciel nocturne même à des latitudes géomagnétiques aussi basses que 30°. Elles devraient être mises en fonctionnement dans les rares occasions où des aurores sont visibles.

3. S. Chapman presented the following resolution which was approved by the Commission:

"Commission 21 urges that inactive all-sky cameras be set up at night-sky stations even in geomagnetic latitudes as low as 30°. They should be put in operation on rare occasions when auroras become visible."

Commission 22 (Meteors and Meteorites/Météores et des Meteorites)

Commission 22—see page 271.

Commission 22—voir page 271.

RECOMMENDATIONS

1. To study experimentally in laboratories, and also by means of rockets and satellites, the physical parameters entering into theoretical and analytical work on meteor investigations, namely:

- (a) the accommodation coefficients for gases and solids in the range 1 eV — 100 eV;
- (b) the inelastic excitation and ionization cross-sections for atom-atom collisions;
- (c) the macroscopic behaviour of the excitation mechanism (air-density dependence of the luminosity-producing mechanism).

(Proposed by R. N. Thomas, F. L. Whipple.)

2. To undertake observations of micro-meteorites from Earth artificial satellites and cosmic rockets in order to determine:

- (a) the energy and momentum of the particles simultaneously;
- (b) the distribution of radiants;
- (c) the variations in rate, particularly at the times of meteor showers; and to collect and recover micro-meteoritic particles.

(Proposed by T. R. Kaiser, L. Kresák, Z. Ceplecha, S. Chapman.)

3. To realize the study of the physical properties of the first suitable bright comet, using direct measurements by means of a cosmic rocket which penetrates to the comet. (Proposed by Z. Ceplecha.)

4. To undertake special radio-echo observations of meteor numbers, simultaneously with the recording of micro-meteorites using Earth artificial satellites. (Proposed by S. M. Poloskov.)

5. To combine photographic, radar and spectral observations of meteors to obtain complete data of individual meteors, mainly with respect to the physical processes of meteor flights. (Proposed by Z. Ceplecha.)

6. To study telescopic meteors by photographic- and image-amplification techniques in the red spectral region. Such observations should be compared with telescopic, visual, and radar observations. (Proposed by Z. Ceplecha, C. L. Hemenway.)

7. To introduce systematic programmes of fireball photography with all-sky cameras equipped with rotating shutters and distributed at mutual distances greater than 100 km, in order to determine orbits and to recover newly-fallen meteorites. (Proposed by Z. Ceplecha.)

8. To realize the same programme of simultaneous photographic and radar studies of meteors in different latitudes, for comparative study of the physical parameters of the upper atmosphere. (Proposed by V. V. Fedynsky.)

9. To realize a wider distribution of meteor wind equipment to yield the large-scale circulation in the 80–100 km region. (Proposed by T. R. Kaiser.)

10. To study by all techniques the atmospheric regions of strong auroral luminosity and ionization, which may reveal new phenomena. (Proposed by S. Chapman.)

11. To use meteor trails simply as radar targets of the absorption and magnetoionic effects in the D-region of the ionosphere. (Proposed by T. R. Kaiser.)
12. To study the influences of interplanetary dust in promoting recombination of ions and electrons, or atomic combinations and reactions. (Proposed by S. Chapman.)
13. To ensure that amateur astronomers do not become discouraged or indifferent to visual observations of meteors for the determination of the hourly rate and magnitude distribution, and for the study of fireballs and persistent trains. (Proposed by C. P. Olivier.)
14. To refer and discuss in future all publications on Zodiacal Light as an important component of interplanetary matter and to keep contact on this subject with Commissions 12, 15, 20, 21, 43, and 44. (Proposed by N. Richter.)

Commission 23 (Carte du Ciel/Carte du Ciel)

Commission 23—see page 276

Commission 23—voir page 276

RECOMMANDATION

Le principe du calcul des constantes des clichés du catalogue photographique est admis. Pour assurer l'homogénéité des calculs le travail serait confié à Eichhorn et Herget qui conviendraient des meilleures solutions à adopter.

Commission 24 (Stellar Parallaxes and Proper Motions/Parallaxes Stellaires et des Mouvements Propres)

Commission 24—see page 278.

Commission 24 expresses the wish that the complete catalog of proper motions found in the Bruce Proper Motion Survey be fully published and distributed to all observatories. The catalog has up to this time been published in mimeographed form and only in a limited edition.

Commission 24—voir page 278.

La Commission 24 exprime le vœu que le catalogue complet de mouvements propres trouvé dans l'étude générale de mouvements propres de Bruce (Bruce Proper Motion Survey) soit publié in extenso et distribué à tous les observatoires. Jusqu'à présent, ce catalogue n'a été publié que sous une forme miméographée et seulement en tirage limité.

W. J. Luyten then asked the Commission to vote on the following resolution: "The Commission on Parallaxes and Proper Motions expresses the wish that the complete catalogue of proper motions found in the Bruce Proper Motion Survey be fully published and distributed to all observatories. The catalogue has up to the present time been published in mimeographed form and only in a limited edition."

By unanimous vote it was agreed upon to present the resolution to the General Assembly. [This was not accepted by the Resolutions Committee, but it is included in the collected Resolutions in Part 2.]

Commission 26 (Double Stars/Etoiles Doubles)

Commission 26—see page 286.

In the report of the meeting of Commission 26 are given the resolutions adopted at IAU Symposium No. 17 (Visual Double Stars).

Commission 26—voir page 286.

Dans le Compte-Rendu de la Commission 26, sont reproduites les résolutions adoptées au Symposium No. 17 de l'UAI (Etoiles doubles visuelles).

IAU SYMPOSIUM NO. 17

IAU Symposium No. 17 on Visual Double Stars, held on 11-12 August 1961 in Berkeley was briefly summarized by the President and Chairman of the symposium. Salient features included: (a) the feeling that double-star observers do not get their share of observing time with large telescopes; (b) the need for liaison with other phases of astronomy; (c) a critical review of techniques and programs; (d) the need to inspire and encourage young people to take up visual double-star astronomy.

The following recommendations were adopted at the symposium:

1. IAU Symposium No. 17 (Visual Double Stars), considering the fundamental importance of double-star observations to our science and recognizing the growing scarcity of qualified observers, stresses the necessity of encouraging young astronomers to take up double-star astronomy.

The symposium expresses the wish that the IAU facilitate by all means at its disposal the sending of young observers to those observatories where this research is actively pursued. (Unanimously adopted.)

Le Symposium No. 17 de l'UAI, considérant l'importance fondamentale des observations d'étoiles doubles pour toutes les branches de l'astronomie et la pénurie actuellement croissante d'observateurs qualifiés, insiste sur la nécessité d'encourager les jeunes astronomes à s'orienter vers l'étude des étoiles doubles.

Exprime le souhait que l'Union Astronomique Internationale facilite par tous les moyens en son pouvoir l'envoi des jeunes observateurs dans les Observatoires où cette étude est poursuivie activement. (Unanimité.)

2. The Symposium recommends that experienced double-star observers be given increased opportunity to use reflectors of large aperture. (Unanimously adopted.)

Le Symposium recommande que les observateurs d'étoiles doubles confirmés se voient offrir davantage d'occasions d'utiliser les grands réflecteurs. (Unanimité.)

3. The Symposium notes with satisfaction that it is the wish of the Republic Observatory, South Africa, to continue its traditional specialization in the field of visual double stars and expresses the hope that the acquisition of a large reflector for this purpose will not be long delayed. (Adopted with one abstention.)

Le Symposium enregistre avec satisfaction l'intention de l'Observatoire de la République d'Afrique du Sud de maintenir sa spécialisation traditionnelle dans le domaine des étoiles doubles visuelles, et exprime l'espérance que l'acquisition d'un grand réflecteur pour ces travaux puisse intervenir prochainement. (Adopté avec une abstention.)

4. The Symposium expresses its gratitude to Dr Jeffers and Dr van den Bos for their monumental work in creating the Card Catalogue on double-star observations and the index catalogue of double stars.

To insure the preservation of these catalogues, now available only at the Lick Observatory, the Symposium recommends that copies be deposited at a few selected observatories. (Adopted by Acclamation.)

Le Symposium exprime sa gratitude à MM. H. M. Jeffers et W. H. van den Bos pour l'œuvre considérable qu'ils ont accomplie en créant le Card Catalogue d'observations et l'Index Catalogue d'étoiles doubles.

Pour assurer la conservation de ces catalogues, qui n'existent actuellement qu'à l'Observatoire Lick, le Symposium recommande que des copies soit déposées dans un petit nombre d'Observatoires choisis. (Par Acclamation.)

The proceedings of the symposium will appear in the *Publications of the Astronomical Society of the Pacific*; (added in proof: Vol. 74, No. 436, 5-34, February 1962.)

Commission 27 (Variable Stars/Etoiles Variables)

1. With the available Durchmusterung maps the positions for equinox 1900.0 in the *General Catalogue of Variable Stars* are not practical. The old equinoxes of 1855.0 and 1875.0 are to be preferred (Hoffmeister).

2. Galactic co-ordinates in the new IAU system (See *Information Bulletin No. 1*, June 1959) should be computed and published for all variables. (Mavridis).

DEFINITION OF THE NEW I.A.U. SYSTEM OF GALACTIC CO-ORDINATES

At the Dublin General Assembly of the International Astronomical Union in 1955, Sub-Commission 33b of the Union was appointed "to investigate the desirability of a revision of the galactic pole and of the zero of galactic longitude". At the Moscow General Assembly in 1958 the conclusions and recommendations of this Sub-Commission were reported and discussed in a joint meeting of Commissions 33 (Structure and Dynamics of the Galaxy), 33b, and 40 (Radio Astronomy). The General Assembly subsequently passed a resolution proposed by Commissions 33 and 40 which, among other items, contained the following recommendations:

..... "(c) That Commission 33b be authorized to define the exact values of the co-ordinates of the pole and of the zero of longitude immediately after the final reduction of the relevant observations is finished.

(d) That Commission 33b be charged with the communication of these values to the members of the I.A.U. and to all other interested institutions and individuals".

Commission 33b has now completed the final reduction of the observations referred to in item (c), and it has defined the following values of the relevant quantities:

- (1) The new north galactic pole lies in the direction
 $\alpha = 12^{\text{h}}49^{\text{m}}$ $\delta = +27^\circ.4$ (equinox 1950.0)
- (2) The new zero of longitude is the great semi-circle originating at the new north galactic pole at the position angle
 $\theta = 123^\circ$ with respect to the equatorial pole for 1950.0
- (3) Longitude increases from 0° to 360° . The sense is such that, on the galactic equator, increasing galactic longitude corresponds to increasing right ascension. Latitude increases from -90° through 0° to $+90^\circ$ at the new north galactic pole. The system is therefore similar to the OHLSSON system of co-ordinates.

The above quantities are to be regarded as exact so that the new galactic co-ordinates may be computed to any desired accuracy in terms of right ascension and declination for the equinox 1950.0

Other Useful Values (restricted accuracy).

The quantities which follow have been computed from the definition but are given only to an accuracy of the nearest integer in the last digit.

- (a) The 1900.0 values corresponding to those in the definition

$$\left. \begin{array}{l} \text{New pole: } \alpha = 12^{\text{h}}46^{\text{m}}.6 \\ \quad \delta = +27^\circ40' \end{array} \right\} 1900.0$$

New zero of longitude at position angle $\theta = 123^\circ04'$ (1900.0)

- (b) The old galactic co-ordinates of the new pole

$$l^I = 347^\circ.7, \quad b^I = +88^\circ.51$$

- (c) Position of the point of zero longitude and latitude (new system),
 $l^{\text{II}} = 0, \quad b^{\text{II}} = 0$.

In equatorial co-ordinates

$$\alpha = 17^{\text{h}}39^{\text{m}}.3, \quad \delta = -28^\circ54' \quad (1900.0)$$

$$\alpha = 17^{\text{h}}42^{\text{m}}.4, \quad \delta = -28^\circ55' \quad (1950.0)$$

In old galactic co-ordinates

$$l^{\text{I}} = 327^\circ.69, \quad b^{\text{I}} = -1^\circ.40$$

Nomenclature

At the Moscow Assembly it was decided that the symbols l, b should be retained for galactic longitude and latitude respectively. Commission 33b suggests that, during the transition period, the symbols $l^{\text{I}}, b^{\text{I}}$ should be used for the old system and $l^{\text{II}}, b^{\text{II}}$ for the new system. The Commission also strongly recommends that, apart from these superscripts, it should be made quite clear whether the galactic co-ordinates used in any publication are based on the old or the new system.

Basis for choice of new system

The new system is intended to be oriented, as closely as is now practicable, so that the pole is perpendicular to the mean plane of the Galaxy and the circle of zero longitude passes through the galactic centre. The pole position was based primarily on the distribution of neutral hydrogen in the inner parts of the Galaxy ($R < 7$ kpc, assuming $R_{\text{sun}} = 8.2$ kpc); the most precise evidence on the galactic centre came from the location of the radio source Sagittarius A, which is presumed to be the galactic nucleus. It remains a problem for future investigation to determine to what extent more exact positions of the layer of neutral hydrogen and the galactic nucleus deviate from the quantities adopted for the present revision. However, it may be expected that these deviations are small and will not give rise to further revisions of the galactic co-ordinate system in the near future.

The new method of specification of the zero of longitude in terms of its position angle has been chosen because this angle is one of the quantities used directly in conversion formulae from equatorial to galactic co-ordinates.

The equatorial plane of the new co-ordinate system must of necessity pass through the Sun. It is a fortunate circumstance that, within the observational uncertainty, both the Sun and Sagittarius A lie in the mean plane of the Galaxy as determined from the hydrogen observations. If the Sun had not been so placed, points in the mean plane would not lie on the galactic equator.

A report will soon be published giving details of the Commission's investigations.

Conversion Tables

In accordance with a decision taken at the Moscow General Assembly, conversion tables from equatorial to galactic co-ordinates and vice versa, and from the old and new galactic co-ordinate systems into each other, will soon be published under the supervision of Commission 33b.

Recommendation 2 was accepted. Kukarkin stated that the new l and b values will be given to one decimal in the third edition of the *General Catalogue of Variable Stars*.

3. The system of denomination and classification.

(a) Sometimes variable stars are denominated, for which only the mere fact of variability is known. On the other hand many old variables of which the variability is well established are still without final designation. It is suggested that we return to the old standards established by Prager, according to which a variable may be denominated only after some details about type and other properties are known. (Hoffmeister). Hoffmeister also suggests that the old variables mentioned above be observed systematically to decide whether they may be named or not.

(b) It is proposed that a sub-committee of three or four persons reconsider the present system of classification (Plaut). As an example of some unsatisfactory aspects of the present classification Plaut mentions: that some variables classified as δ Sct-type probably are RR Lyrae-type variables; that no clear criteria exist for a distinction between δ Cep and W Vir stars; and that many variables, classified as semi-regular, belong to the long-period or *Mira*-type stars. (This last statement was independently made by Miss Harwood.) Further it has been suggested that systematic checks be made, on existing plate collections, of cataclysmic variables, the assignment of which depends on few and scattered observations. (Hoffleit).

Concerning recommendation 3, Kukarkin remarked that variables are named only when the type is known. Stars which are certainly variable, *e.g.* with a large amplitude, but of unknown type are not named, but they will be published in the *Catalogue of Stars Suspected of Variability*. The Commission strongly recommends that the stars in this catalogue be divided in two groups: (a) variability certain, but type unknown; and (b) suspected variables. The meeting also stressed the importance of an early supplement to the catalogue of suspected variables.

The problems connected with recommendation 3(b) are complicated. The meeting nominated a working group, consisting of Kukarkin, Oosterhoff, Payne Gaposchkin and Harlan Smith, which should report to the Commission in one or two years.

(c) It is suggested that the Commission should study the question of denomination of variables in the Magellanic Clouds. (Wesselink). This question has been provisionally discussed by Sub-Commission 28a at its meeting in the Argentine in December 1960. Many of these variables carry a Harvard number, but in recent years many new variables have been discovered and it is to be expected that many more will be found in the next years to come. Some of the new variables have been denominated and are now given in the *General Catalogue*. It has been suggested that a special system for denomination or numbering be adopted for all the variables within certain regions around the two Clouds and that a special catalogue be prepared, similar to the list of variables in globular clusters, as prepared by Mrs Sawyer Hogg. Any positive decision on this problem will require a great deal of work for one or more persons.

The meeting decided that recommendation 3(c) should also be studied by a working group. The following members were nominated: Arp, Buscombe, Payne Gaposchkin and Wesselink.

28 a. SOUS-COMMISSION DES NUAGES DE MAGELLAN

Report of Meeting, 23 August 1961

PRESIDENT: S. C. B. Gascoigne.

SECRETARY: M. W. Feast.

The *Draft Report* was approved without a discussion. The President drew attention to the fact that there had been a meeting of the Sub-Commission in Cordoba in December, 1960.

The President initiated a discussion on nomenclature for variable stars in the Magellanic Clouds. At present the majority of variables in the Clouds were discovered at Harvard and have HV numbers. However, there are considerable doubts as to whether many of the variable stars can now be recovered as the positions are not generally very accurate and no maps are available for many. Furthermore, extensive work is already in progress which will produce many more variables (*e.g.* the work of the Greenwich astronomers, Derry, etc.). Dr Eggen stated that all Greenwich variables would be given a Greenwich number irrespective of whether or not they had already an HV designation. This was necessary since it was difficult to be certain in many cases of the identification with an HV star. Dr Gascoigne spoke of the help he had received from Dr Shapley and the Harvard Observatory in finding HV stars. Much of the unpublished Harvard material is now in Dr Gascoigne's keeping at Mount Stromlo in card-catalogue form. The best way to make use of this material was discussed, but no final decision was reached. An attempt to map all the variables had been begun at Mount Stromlo, but not completed. Dr Tifft offered help in the construction of charts of Harvard variables. Dr Thackeray proposed a motion that all observers be strongly urged to publish finding charts for all new variables. This motion was passed unanimously. It was also agreed that observers should be urged to print both the scale and orientation on each map. The normal practice (North at top, West to the right) should be followed, and Dr Bok suggested that any plate reproduced should be photo-visual. The President of Commission 27 (Dr Oosterhoff) announced that his commission had set up a small sub-committee to look into the problem of variable star nomenclature in the Magellanic Clouds. This is to consist of Wesselink, Payne-Gaposchkin, Arp and Buscombe.

The meeting then discussed the system of co-ordinates to be adopted in the Magellanic Clouds. Positions of many of the objects in the Clouds are published in the Harvard x , y system. Dr Gascoigne drew attention to the fact that at its Cordoba meeting the Sub-Commission had decided that, where a rectangular co-ordinate system was desired, then the standard co-ordinates ξ , η , as discussed by Wesselink (*M.N.* 119, 576, 1959) should be used in preference to x , y . The Radcliffe Observatory had prepared tables giving x , y , ξ , η , and α , δ for a considerable number of objects. Dr Stoy stated that the section of the 1950° Cape Catalogue covering the Magellanic Clouds had now been finished and could be supplied to interested observatories in microfilm form. This catalogue gives about 10 stars per square degree to $10^m - 11^m$ with an accuracy better than $0''.1$. He also reported on a Cape-Greenwich programme to measure 144 stars per square degree, going down if necessary to $13^m - 14^m$. He felt that these stars will provide a sufficiently fine grid that the position of any object could be measured accurately in α and δ with respect to them. This would probably obviate the need for a rectangular co-ordinate system. Dr Gascoigne said that the Uppsala-Stromlo maps of the Clouds would be ruled in both α , δ and ξ , η . Dr Lindsay noted that whatever system of co-ordinates was used maps were essential in crowded regions.

A number of scientific contributions were then presented. Dr Tifft spoke of his work on NGC 121 and the surrounding field of the SMC, and Dr Walraven of the multi-colour photometry carried out on Cloud B-type stars by himself and his wife. Dr Fehrenbach reported that the telescope to observe radial velocities in the Clouds by his objective prism technique had now been set up in South Africa. Dr Lindsay announced that he and Dr Shapley were preparing a new catalogue of some 900 clusters (mainly open) in the LMC. A Cape-Herstmonceux programme will determine proper motions for foreground stars in the LMC to $15^m - 16^m$ by comparison of new and old (40 to 60 years) astrograph plates. Current work at Mount Stromlo, Sydney (radio), Cordoba and Pretoria (Radcliffe) was reported. There was also a discussion of the frequency of foreground stars to be expected in colour-magnitude diagrams of regions of the Clouds.

4. Hertzsprung recommends that the coefficients of the rectangular co-ordinates of the Sun, X and Y , in the expression:

$$-X \cos \alpha \cos \delta - Y(\sin \alpha \cos \delta + 0.4337 \sin \delta)$$

be given for all the variables for which the reduction to the Sun is significant.

Recommendation 4. The meeting agreed that it would not be practicable to publish the co-efficients of X and Y for the individual variables in the *General Catalogue*, but that it would be better to produce a table of the coefficients as a function of α and δ . Walker, Irwin and some others were in favour of new and more accurate tables of the actual solar corrections. As Kukarkin was willing to publish tables of the coefficients to six decimals, the meeting gratefully accepted this.

6. It is recommended that a list be prepared of all the intrinsic variables which have been observed photo-electrically (Plaut).

Recommendation 6. Hoffleit and Walker suggested that such information be included in the next edition of the *General Catalogue*. As Kukarkin remarked that it probably will be possible to follow this suggestion, although many complications are involved, the meeting strongly supported this idea.

7. Strohmeier would like to see quicker ways of communicating data on newly-discovered bright variables and of special phenomena. He suggests that the IAU *Circulars* be used for this purpose. Detre has similar complaints and suggests the establishment of a special publication of Commission 27 in the form of an international journal on variable stars, to be issued twice a year or so. If published in Hungary, the Konkoly Observatory could bear the cost of printing and a term of printing of 2-3 months could be guaranteed.

Recommendation 7. After some discussion the meeting decided to establish an *Information Bulletin on Variable Stars*. This has become possible through the initiative of Professor Detre and the generosity of the Konkoly Observatory. The bulletin will *not* be a new journal for articles on variable stars, but its main purpose will be the rapid communication of discoveries, interesting observations, requests for photometric or spectroscopic observations, etc. Therefore speed will be essential. Texts in English or French should be forwarded direct to:

Professor L. Detre, Budapest XII, Postoffice 114, Box 67

Commission 28 (Extra-Galactic Nebulae/Nébuleuses Extra-Galactiques)

Commission 28—see page 303.

Commission 28—voir page 303.

- (e) The Commission sent forward to the Executive Committee of the Union a resolution that the name of the Commission be changed to 'Commission on Galaxies' (Commission des Galaxies). [This was approved by the Executive Committee and the General Assembly.]

Commission 29 c (Stellar Classification/Classifications Stellaires)

Sub-Commission 29 c—see page 321.

Sous-Commission 29 c—voir page 321.

RECOMMENDATIONS

It was strongly recommended by the Sub-Commission that when the results of objective-prism surveys are published suitable finding charts also be made available, especially for stars near or below the *Durchmusterung* limits, to facilitate slit-spectrographic observations of individual objects. Such charts can easily be made from the existing Palomar or Lick *Sky Atlases*, but the specific requirements depend upon the magnitudes of the stars involved and the complexity of the fields. The President recommended that the blue Palomar prints be used, rather than the red.

A formal resolution, proposed by W. W. Morgan, requesting that Sub-Commission 29c be given Commission status, was seconded and approved unanimously by those members of the Sub-Commission present. This resolution was transmitted to the Executive Committee by the President of the Sub-Commission, but was not accepted. The Sub-Commission becomes a Committee of Commission 29.

Commission 31 (Time/L'Heure)

Commission 31—see page 329 (See also Commission 4.)

1. The provisional value of ephemeris time that is obtained by comparing the Moon's mean longitude, given by observations, referred to the equinox of FK 4, with the positions tabulated in the *Improved Lunar Ephemeris* is denoted by E.T.O. The difference E.T.O.—U.T.2 is denoted by ΔT_0 .

3. It is recommended that high-altitude satellites be launched which can be used for experiments concerning the fundamental nature of time.

Commission 31—voir page 329 (Voir aussi Commission 4.)

1. La valeur provisoire du temps des éphémérides, obtenue en comparant la longitude moyenne de la Lune résultant d'observations rapportées à l'équinoxe du FK 4, avec les positions données par l'*Improved Lunar Ephemeris* est appelée T.E.O. La différence T.E.O.—T.U.2 est appelée ΔT_0 .

3. On recommande le lancement de satellites artificiels de haute altitude qui puissent être utilisés pour les expériences sur le caractère fondamental du temps.

RESOLUTIONS ADOPTED BY COMMISSION 31

1. The provisional value of Ephemeris Time that is obtained by comparing the Moon's mean longitude, given by observations, referred to the equinox of FK 4, with the positions tabulated in the Improved Lunar Ephemeris is denoted by E.T. o. The difference E.T. o—U.T. 2 is denoted by ΔT_0 .

2. A list of new conventional longitudes of time-determining stations shall be prepared by the BIH in consultation with the observatories concerned. Time-keeping will be based on these new longitudes as of 1 January 1962.

3. It is recommended that high-altitude satellites be launched which can be used for experiments concerning the fundamental nature of time.

4. Each year, after consultation with observatories concerned in the transmission of time pulses and constant frequency, the BIH shall recommend a value of the fractional offset from nominal frequency to be used during the next year in order that the time pulses shall be nearly on the system U.T. 2. The offset is based on an assumed frequency of 9 192 631 770 c/s for caesium.

5. The use of rhythmic time signals should be discontinued.

RÉSOLUTIONS ADOPTÉES PAR COMMISSION 31

1. La valeur provisoire du temps des éphémérides, obtenue en comparant la longitude moyenne de la Lune résultant d'observations rapportées à l'équinoxe du FK 4, avec les positions données par l'*Improved Lunar Ephemeris* est appelée T.E. o. La différence T.E. o—T.U. 2 est appelée ΔT_0 .

2. Une liste des nouvelles longitudes conventionnelles des stations horaires sera préparée par le BIH en consultation avec les observatoires intéressés. La conservation de l'heure sera basée sur ces nouvelles longitudes dès le 1er janvier 1962.

3. On recommande le lancement de satellites artificiels de haute altitude qui puissent être utilisés pour des expériences sur le caractère fondamental du temps.

4. Chaque année, après avoir consulté les observatoires intéressés par la transmission des signaux horaires et des fréquences constantes, le BIH recommandera une valeur du décalage de la fréquence nominale qui doit être utilisée durant l'année suivante, de sorte que ces signaux horaires restent approximativement dans le système T.U. 2. Le décalage est basé sur la fréquence adoptée de 9 192 631 770 Hz pour le césum.

5. Les signaux horaires rythmiques devront cesser.

Commission 37 (Star Clusters and Associations/Amas Stellaires et des Associations)

Commission 37—see page 340.

Commission 37—voir page 340.

RECOMMENDATIONS

1. *Nomenclature of associations.* Following A. Blaauw's suggestion to revise the present somewhat confusing system of nomenclature of associations (*e.g.* II Cas and Cas II which mean different things), a small Working Group (Blaauw, Markarian, Morgan, Schmidt, Vanýsek, Haffner (Chairman)) was established and entrusted to make precise proposals for remedying the annoying situation. At the second meeting the Working Group presented the following recommendations:

- (a) The nomenclature introduced by Markarian in 1952 will be kept as a basic system.
- (b) Associations subsequently discovered and denominated by other observers will get new designations within the Markarian system.
- (c) A vocabulary will be worked out within the next months which will give the new designation for all associations contained in the lists of Morgan and Schmidt.
- (d) This vocabulary will be drafted by Dr Vanýsek and Dr Ruprecht, approved by the Working Group and published in five astronomical periodicals.

These recommendations were unanimously adopted.

2. *Duplication of cluster photometry.* The question had been asked to what extent photometric work in clusters will serve a sensible purpose after so many clusters (at least the brighter ones north of -25°) have been studied. In reply, H. L. Johnson commented on the newly published (*Publ. U.S. Naval Obs.* Vol. VII, 19, and *Lowell Obs. Bull.* No. 113) papers on 70 clusters. He emphatically stressed that he does not consider this work of himself and his collaborators to settle the photometric questions in those clusters. Rather would he like to encourage any further work on these and other clusters, both observational and theoretical. As a striking example M 25 was mentioned by the President, which has been investigated by four different astronomers within twelve months (*Ap. J.* 131 and 133). In spite of that, the results do not agree and the problem still remains unsolved.

3. *Presentation of Cluster data.* A vivid discussion on the publication of cluster work resulted in the following recommendations:

Any paper on photometric cluster work should give:

- (a) In the introduction, equatorial and new galactic co-ordinates (to $0^{\circ}.1$) of the cluster;
- (b) a finding chart with orientation and scale indicated;
- (c) full photometric data on the photo-electric standard sequence stars marked on the finding chart.

This was unanimously adopted.

Commission 40 (Radio Astronomy/Radio-Astronomie)

Commission 40—see page 354.

Commission 40—voir page 354.

APPENDICE I. RESOLUTIONS BY COMMISSION 40 FOR THE ATTENTION OF THE EXECUTIVE COMMITTEE

Resolution 1

Commission 40 views with concern the increasing contamination of the space around the Earth by radiating and scattering objects. It feels that no group has the right to change the Earth's environment in any significant way without full international study and agreement.

Resolution 2

Commission 40 expresses its appreciation for the fact that the plans for project West Ford have been publicly announced well ahead of launching and that it has been stated officially that the U.S. Government policy on further launchings will be guided by the principle that such projects should not be undertaken unless sufficient safeguards have been obtained against *harmful interference with astronomy*.

Nevertheless, Commission 40 views with the utmost concern the possibility that the belt of dipoles proposed in project West Ford might be *permanent*, and is completely opposed to such an experiment until this question is clearly settled in published papers and time has been given for their study. Whatever the limitations of present radio astronomical equipment, the Commission is inflexibly opposed to any steps that might permanently compromise future development in radio and optical astronomy.

Resolution 3

If the objections of Resolution 2 above can be removed and the experiment West Ford is performed, Commission 40 regards it as essential that the fullest observations of, or experiments on, the properties and variations of the belt be made by all possible means.

Such observations should be made and analyzed according to the highest scientific standards and by means of the best equipment available, bearing in mind that barely detectable signals today may be a great source of interference to future scientific research with more sensitive equipment.

These observations or experiments are likely to be difficult to perform and will in many ways parallel those carried out by the bodies responsible for performing the experiment West Ford. Moreover, much specific information such as precise and up to date ephemeris data will be required in any case. Commission 40 therefore urges the establishment of channels in the IAU to obtain fast and full co-operation among the astronomers making such observations and to provide for world-wide dissemination of the results along accepted standards in scientific research.

Viewing the position taken by the U.S. Government that any decision on later experiments of this type would be contingent on the results of the analysis of the presently proposed experiment, Commission 40 appreciates the offer of the U.S. Government to extend co-operation and, in particular, asks that the U.S. Government grant full privileges to a group of astronomers, acceptable to the IAU to co-operate with project West Ford authorities to perform quantitative experiments and observations using West Ford facilities with the purpose of determining the properties of the belt and its variations with time and position and to assess its impact on present and future research in astronomy and radio astronomy.

4. Considering that the exclusive allocation of channels for radio astronomy is essential for the successful pursuance of this branch of astronomy; that in order to be effective one such channel, having a width of at least 1%, should be available in every octave consistent with earlier discussion relating to specific frequencies; that at present only one world-wide allocation of a channel has been agreed upon;

proposes that all possible steps be taken to include radio astronomy in the agenda of the proposed extraordinary administrative radio conference of ITU in 1963; and that steps be taken to make allocations for radio astronomy approximately in each octave of the spectrum on a world-wide basis.

4. Considérant que l'attribution exclusive de canaux de fréquences pour la radioastronomie est essentielle au développement et au succès de cette branche de l'astronomie; que, pour être efficace, un tel canal, d'une largeur d'au moins 1%, devrait être utilisable dans chaque octave, d'une façon cohérente avec les discussions antérieures se référant à des fréquences particulières; qu'à l'heure actuelle l'attribution à l'échelle mondiale d'un seul canal a été l'objet d'un accord;

la Commission 40 propose que toutes les démarches possibles soient entreprises pour inclure la radioastronomie dans l'ordre du jour de la conférence radio extraordinaire de caractère administratif projetée par l'I.T.U. en 1963, et que des dispositions soient prises pour faire à la radioastronomie des attributions de fréquence, approximativement dans chaque octave du spectre, et ce à l'échelle mondiale.

APPENDICE II. RECOMMENDATION ON FREQUENCY ALLOCATIONS FOR RADIO ASTRONOMY

Considering that the exclusive allocation of channels for radio astronomy is essential for the successful pursuance of this branch of astronomy,

that in order to be effective one such channel, having a width of at least 1%, should be available in every octave consistent with earlier discussion relating to specific frequencies;

that at present only one world-wide allocation of a channel has been agreed upon;

Proposes that all possible steps be taken to include radio astronomy in the agenda of the proposed extraordinary administrative radio conference of ITU in 1963; and that steps be taken to make allocations for radio astronomy approximately in each octave of the spectrum on a world-wide basis.

Commission 41 (History of Astronomy/L'Histoire de l'Astronomie)

Commission 41—see page 356.

1. Commission 41 expresses its desire that the National Committees of Astronomy in countries adhering to the Union should organize, wherever possible, commissions on the History of Astronomy in order to co-ordinate the efforts of scientists in allied fields.

Commission 41—voir page 356.

1. La Commission 41 exprime le vœu de voir les Comités Nationaux d'Astronomie des pays adhérant à l'Union organiser, partout où cela sera possible, des commissions sur l'Histoire de l'Astronomie, afin de coordonner les efforts des chercheurs dans des domaines voisins.

2. Resolutions

After discussion of the *Draft Report* and of its propositions, Commission 41 adopts the following *resolutions*:

1. The Commission expresses its desire that the National Committees of Astronomy in countries adhering to the IAU organize wherever possible Commissions on the History of Astronomy, in order to co-ordinate the efforts of scientists in allied fields.

2. The Commission expresses the hope that the extension of its membership to include Presidents of future national commissions on the history of astronomy, as designated by their National Committees, will be approved by the Executive Committee of the IAU in the few cases when such persons are not members of the IAU.

3. The Commission desires to undertake the preparation and publication of an annual bibliography of studies in the history of astronomy, and its distribution to members of Commission 41, to national commissions, to National Committees, to observatories and interested scientists.

(The President expressed the hope that the U.S.S.R. Academy of Sciences will have the kindness to publish this bibliography for the next three years).

4. The Commission desires to promote the exchange of information by publishing and distributing, under IAU auspices, an *Information Circular*, of which several issues would appear each year. (The President expressed the hope that the U.S.S.R. Academy of Sciences will similarly have the kindness to publish the *Circulars* during the next three years).

5. The Commission accepted all the recommendations made on pages 462-463 of the *Draft Report*, (see Vol. XIA), except the first, which was approved in principle but deferred to a later time.

Two additional suggestions were accepted.

(a) The desirability of encouraging individual observatories to compile or bring up to date their histories (D. Alter),

(b) The expression of encouragement to Dr T. Przypkowski (Jedrzejow, Poland) to complete and publish an illustrated description of his unique collection of sundials, other gnomonic instruments and books, started by his ancestor in 1738 (P. Kulikovsky).

Commission 44 (Extra-Terrestrial Observations/Observations Astronomiques en dehors de l'Atmosphère Terrestre)

Commission 44—see page 389.

1. Commission 44 recommends that, in addition to the plans for astronomical space experiments of high scientific interest which have been already planned, consideration be given to the launching of a space probe into the close vicinity of a comet.

Commission 44—voir page 389.

1. La Commission 44 recommande qu'en sus des projets d'expériences astronomiques spatiales de grand intérêt scientifique qui ont déjà été prévues, attention soit portée au lancement d'une fusée-sonde au voisinage immédiat d'une comète.

RESOLUTION

La fin de la séance est consacrée à la discussion d'une résolution relative à l'étude des comètes par engins extraterrestres. La discussion, à laquelle participent MM. Davis, Gold, Goldberg, Muller, Swings, Whipple et Miss Roman, aboutit à la rédaction de la recommandation ci-après:

Commission 44 recommends that, in addition to the plans for astronomical space experiments of high scientific interest which have been already planned, consideration be given to the launching of a space probe into the close vicinity of a comet.