19. COMMISSION DE LA VARIATION DES LATITUDES

PRÉSIDENT: M. P. Sollenberger.

DIRECTEUR DU BUREAU: M. G. Cecchini.

MEMBRES: Mme Aksentjeva, MM. Baldini, Barros, Beals, Buchar, Carnera, Castro, Mme Chudovicheva, MM. Duerksen, Fedorov, Fleckenstein, Gulatee, Hattori, Heiskanen, Ikeda, Spencer Jones, K. A. Kulikov, Lambert, Markowitz, Miyadi, Munk, Nicolini, A. J. Orlov †, B. A. Orlov, Peres, Randic, Rice, Mme Romanskaya, MM. Stoyko, Tardi.

CENTRAL BUREAU

Prof. Cecchini reports that he has continued to receive reports of the work of all of the International Latitude Stations, except that no report has been received as to the observations made at Gaithersburg since October 1953. Continuous observations were made at that station, but were delayed in transmission.

The Central Bureau has reduced 20,000 observations made by the northern stations since 1952.0. This work has been carried on without making any modifications in the reduction of the instrumental constants or in the methods of analysis of the observations, since it was believed that such changes would have little practical utility and would add confusion in later years.

In accordance with the decision reached at the special meeting in Rome in September 1954 (see section headed 'General Remarks' at the end of this draft report) the Central Bureau has prepared and forwarded to the observing stations a new observing programme, which is to be put into effect by the northern station on 6 January 1955. This programme consists of twelve groups, each two hours in duration. Three consecutive groups will be observed on each night. The stars were so selected as to retain the maximum number of star pairs, or at least of stars, which had been previously observed. This is of particular importance in the case of groups IV and X, which contain star pairs that have been observed at least since 1906. The fact that the stars will now be observed during a longer period on each night will aid in the analysis of the non-polar variation of latitude. Also the fact that groups IV and X are centred around 6 and 18 hours of right ascension will be of great importance in analysing the secular variation of the polar motion.

INTERNATIONAL LATITUDE STATIONS

Canberra

The new photographic zenith tube which is being manufactured by Sir Howard Grubb, Parsons and Company for the Commonwealth Observatory at Canberra, Australia, has not yet been delivered, and consequently no observations for latitude variation have been secured. It is expected that the new telescope will be received sometime in 1955.

Carloforte

Observations were continued in the same manner as previously by the latitude station at Carloforte, Sardinia. During the period from 1952.0 to 1954.5, a total of 5152 observations were made.

Gaithersburg

Observations were made continuously with the zenith telescope at Gaithersburg, Maryland, except for a period of 20 days in September 1953, when a major overhaul of the instrument was made. This included cleaning and repolishing of the optical elements,

cleaning, refitting, and testing of the micrometer screw, and replacement of the telescope pier. The observer was Earl L. Williams. During the three years ending 30 June 1954, 3767 star pairs were observed.

Kitab

Observations for the variation of latitude were carried on regularly at Kitab, using the zenith telescope of 110 mm. aperture and 1290 mm. focal length. The regular international programme has been carried on, amounting to about 1300 observations per year, and in addition the observations called for by the new proposed international programme have been undertaken.

La Plata

In the period 1952–55 a total of 1970 star pairs were observed with the Wanschaff zenith telescope by Prof. Baldini, with the assistance of Mr A. L. Cabrera.

Mizusawa

The International Latitude Station at Mizusawa, under the direction of Tetsuro Ikeda, conducted continuous latitude observations with both the visual and the floating zenith telescopes. In addition, longitude, meteorological, and other observations were carried on. Using the visual zenith tube, observations were also made of circumpolar stars at elongation, and of scale-pair stars, for the determination of the screw value. A photographic zenith tube is under construction, and is expected to be completed in 1955.

The principal research works pertaining to latitude were as follows:

Tadahiko Hattori made a determination of the constant of nutation, using the latitude observations at the station during the period 1900–35. Various methods of treatment were used, and generally speaking the nutation constant derived was of the order of $9''.200$ rather than $9''.210$.

A study of the latitude observations made with the floating zenith tube, and a comparison of the results obtained from those observations with the results obtained with the visual instrument, was made by Tadahiko Hattori. The results are given in the publications of the Observatory. The variation of latitude is almost identical for both instruments, except for a small constant difference, which is too large to explain by the difference of position of the two instruments. It is noted that wind effect is large and direct in the case of the floating telescope, and small in the case of the visual one.

Shigeru Yumi investigated: (1) the effect of temperature gradient in the meridian of the observing, on the observed latitude; (2) the effect of non-homogeneous temperature distribution in the mercury of the floating zenith telescope on the observed latitude: and (3) periodic slight motion of the two axes of the zenith telescope. A linear relation was found between the first effect listed and the closing sum in latitude observations. A mean temperature difference between the opposite sides of the mercury basin of $0^{\circ}.09$ C. was found. This would indicate a latitude error of $0''.06$, the observed latitude being too small. During the period 1940–49 the observed latitudes with this instrument were actually $0''.075$ less than those observed with the visual telescope. The effect of the third cause listed above was found to be negligible.

Chikara Suguwa investigated: (1) the relation between diurnal variation of air temperature and the observed latitudes; (2) wind effects on the observed latitudes; and (3) the differential refraction in latitude observations.

Ukiah

Observations were made continuously with the zenith telescope at Ukiah, California. The observer was Mr L. F. Caouette, except for a brief period at the end of June 1954, when he was relieved by Mr Norman E. Syler. During the three years ending 30 June 1954, 6353 star-pairs were observed.

Other Latitude Stations

Basle

In 1952 observations of 51 star-pairs from the catalogue FK 3 were made by the method of Horrebow-Talcott at the Observatory of Basle-Binningen, Switzerland. The purpose was the determination of the constant of aberration and nutation, but the computations are not yet completed. During 1953–55 it had been the intention to measure the declinations of the stars of the International Latitude Service by means of prime vertical observations according to the method of Struve-Niethammer. Owing to the reorganization of the Observatory, however, it has not been possible to carry out the work as planned. For the future a new programme of re-observation of these star declinations is planned.

At the 1954 assembly of the I.U.G.G. in Rome, members of Commission 19 discussed a catalogue of the stars of System A (Central Bureau Potsdam, 1906) referring to the station at Basle. Dr Fleckenstein points out that 17% of the stars of System A are in Catalogue FK 3 or FK 3 Suppl., and that this method is applicable only to simple transit instruments with accurate screws. He says that it is desirable that similar observations be made at other stations. He also says that as a result of the reorganization of the Basle Observatory it is probable that a station for latitude service will be founded independent of the astrophysical observatory at Binningen.

Belgrade

Regular latitude observations were continued at the Belgrade, Yugoslavia, Observatory. This work was done with the visual Bamberg telescope of 110 cm. aperture, using the chain method. From 1949 up to the end of 1954, 5700 pairs were observed. During this period the micrometer screw, level, and instrumental constants were carefully investigated. All the material is under discussion. The values of the observed latitudes are published in the *Bulletin* of the Belgrade Observatory, and immediately sent to the Central Bureau of the I.A.U.

For the coming year, in addition to the programme described above, observations are planned with a Bamberg transit instrument in the prime vertical.

Dehra Dun

Mr B. L. Gulatee reports that no observations for variation of latitude have been made in India in recent years.

Greenwich

No observations for the determination of latitude have been made by the Royal Greenwich Observatory since 1939.

The photographic zenith tube which was designed by the Observatory, and which embodies substantial changes from the design of the Florida instrument, has been completed. The foundations of the building to house it were also complete at the date of the last report (August 1954), and it was expected that the building itself would be completed within a few weeks, after which the erection and adjustment of the instrument would begin.

The Astronomer Royal invites attention to the uncertainties in the micrometer-screw values and their temperature coefficients, as determined by the International Latitude Stations. He points out that the wide scatter in the various determinations over a period of years cannot be real, and suggests that some discussion of this matter at Dublin may be desirable.

When Vol. **9** of the *Results of the International Latitude Service* becomes available, it is expected that a determination of the constants of nutation, based on all the I.L.S. work, will be undertaken at Greenwich.

Neuchâtel

A new photographic zenith tube, manufactured by Sir Howard Grubb, Parsons and Company, was installed at the Observatory of Neuchâtel, Switzerland, in the spring of 1954. The instrument has a focal length of 343 cm. and an aperture of 25 cm. The cycle of four exposures and reversals on each star is made automatically. An observing list of about 140 stars has been adopted, and at present two observers are employed. Since only six of the stars are in the FK3 or the FK3 Supplement, and 49 in the General Catalogue of Boss, the work must be considered preliminary until accurate positions can be secured.

Prof. Guyot, the director of the Observatory, states that they are much interested in doing latitude work, but that no concrete results will be available until the constants of the instrument and the star positions can be determined with sufficient accuracy.

Ottawa

The new photographic zenith tube of the Dominion Observatory at Ottawa, Canada, was mounted in the fall of 1951. It has an aperture of 10 inches and a focal length of 167 inches. It was designed and constructed in Canada, following the general design of the Richmond, Florida instrument, but differing in details. The first few months of operation were experimental, to develop methods of computation. The operation of the instrument is now very reliable. The observations taken during the first two years, together with transit circle observations, were used to improve the star positions. The observing list has a total of 146 stars, divided into twelve groups, and two successive groups are observed on each clear night. An automatic machine is used to control the taking of the observations.

The probable error of the latitude determined by a single star on a single night, as judged by the agreement with the results from other stars on the same night, is 0″.20. This would indicate that the error for a full plate of 24 stars should be less than 0″.05. The agreement of the results from different nights, however, indicates a considerably larger error. This is considered to be due to the effect of varying inclinations of the layers of equal density in the atmosphere above the telescope. This effect is aggravated by the large heat capacity of the present telescope house.

Paris

Prof. Danjon reported that a latitude service was established at the Paris Observatory. Observations for this purpose commenced with the impersonal astrolabe in October 1953.

Richmond

The photographic zenith tube at Richmond, Florida, which is designated as PZT no. 2 of the Naval Observatory, was operated continuously for the determination of latitude and time. In November 1954 the instrument and other equipment, which had previously been housed in temporary quarters, were moved to permanent buildings at a new site about one mile south of the old one. The move was made with only a negligible loss of observations.

U.S.S.R. stations

In addition to the International Latitude Station at Kitab, previously discussed, the Soviet Union carried on latitude observations at Pulkovo, Poltava, the Engelhardt Observatory near Kazan, and Gorky. The instruments used varied from 90 to 135 mm. in aperture and from 1150 to 1760 mm. in focal length. Two instruments were used at Poltava. A total of about 8400 observations were made annually at these stations, using

both star pairs and zenith stars. At each observatory preliminary latitudes were computed as a rule the next day after the observations. The results were published in the *Astronomical Circular of the U.S.S.R.* (*Astr. Circ.*) and elsewhere.

Mme S. Romanskaya completed the reduction of observations with the large Pulkovo zenith telescope from 1929.0 to 1941.6. During the period 14,783 star pairs were observed, the mean error of a single observation being $\pm 0''.16$.

Extended investigations into every phase of latitude work were carried on by Soviet astronomers of which it is possible to give only brief mention. By means of an investigation of the mean latitudes of all the international stations, as well as of Pulkovo, Greenwich, and Washington, the late A. Orlov found that there was a continuous latitude change which could not be considered due to polar motion. Similar results were obtained by E. Federov and Miss E. Obrezkova, who found slow latitude changes at Mizusawa, Carloforte, and Ukiah from 1899 to 1934. Since the rate of change was not uniform, the effect could not be wholly explained by errors of proper motions. From these results it is concluded that, in the present state of knowledge, only the periodic portions of the latitude variations should be taken into account in the reduction of time observations.

A. Orlov developed a method for computing the polar co-ordinates from the observations made at a single station. This method is based on the assumptions that (1) the annual polar motion is invariable, and (2) Chandler's motion may be replaced by a circular one over a short period of time, such as a year. While these assumptions are not rigorous, it has been found that very satisfactory results may be obtained. The difference between the polar position derived by this method, using only Pulkova observations, and the results of the International Latitude Service, are reported to be $\pm 0''.05$. In 1952 the Poltava Observatory began calculating the polar motion by this method, using the results of latitude observations at Poltava, Pulkova, Kazan, and Kitab. These results are sent by wire to the Central Bureau of the Soviet Time Service, for use in the time computations.

A. Orlov and Miss E. Evtushenko derived values of the diurnal lunar term in latitude variation, which differ somewhat from the theoretical value based on an elastic Earth. It has been suggested that the discrepancy is due to the dynamical effect of the Earth's viscous core.

In the investigation of continuous changes of the mean latitude, mentioned above, it was noted that systematically different results were frequently given by star pairs having mean positions north and south of the zenith. These differences were presumed to be due to errors of screw values. At Mizusawa, Carloforte and Ukiah these discrepancies reached $0''.02$ during the period of the first 35 years of observations.

N. Popov examined the effect of temperature on the screw value, focal length, and distance between the threads of the large Poltava zenith telescope. S. Drozdov obtained the positions of 202 stars in the narrow zenith zone at Poltava by comparing the latitudes obtained by means of those stars with the latitudes indicated by star pairs. E. Fedorov determined the difference between the proper motions derived from the work of the International Latitude Service during 1912–22 and during 1922–34. M. Molodensky computed the theoretical value of the period of free nutation, using various assumptions as to the mechanical properties of the Earth. I. Maxim studied the polar tide at sea and in the atmosphere. Mme Z. Aksentjeva and Miss A. Ivanova published the results of horizontal pendulum experiments.

The problem of selecting the most desirable programme of latitude work has been discussed by S. Kulagin, A. Philippov, A. Orlov, E. Fedorov, V. Sakharov, and I. Korbut. The programme proposed and tested at Poltava was considered the most suitable for present aims of the latitude service.

Apart from the programme proposed by the Central Bureau of the International Latitude Service the proposal of the Soviet Astronomers was discussed at the Rome Meeting, but it was decided that the essential change of the programme of the International Latitude Service should be postponed to the termination of the International Geophysical Year and then discussed in connexion with the results to be obtained with new instruments (the PZT's and Danjon's astrolabe).

Washington

Observations for the determination of latitude and time have been continued in Washington, using the original photographic zenith tube which is now designated as PZT no. 1. This instrument is old and, although it has been partially reconstructed, it still retains some defects of design. A new instrument, PZT no. 3, has been constructed with design features similar to those of the photographic zenith tube in use at Richmond, Florida. The new telescope was put into service near to the old one in May 1954. It is planned to operate both of the instruments for about one year, after which observations with PZT no. 1 will be discontinued. The indications so far are that, while the two instruments give closely similar results, the latitude and time derived with PZT no. 3 are more uniform and accurate than those obtained with the older telescope.

Zagreb

At the Observatory of the University of Zagreb, Yugoslavia, latitude observations have been made throughout 1952, 1953 and 1954 using the 90 mm. Bamberg Zenith Tube. The reductions have been completed and the results will be published in due time.

Dr Randic has investigated the use of methods other than Horrebow-Talcott. He considers Pewzov's method as accurate as Talcott's and perhaps more useful, as the star pairs can be used longer, except near 6 and 18 hours. By using an impersonal micrometer, and making about fifty contacts on each star of a pair, he thinks that the accuracy of a latitude determination with a pair is greater by Pewzov's method than by Talcott's. Dr Randic has made some observations to test the matter, and he expects to have the results of the test ready for discussion at Dublin.

Dr Randic has studied the construction of a zenith tube of new design. The plate holder moves precisely according to the diurnal motion, and has photographed on it an intermittently illuminated artificial star, regulated by a clock. This results in a series of dots, providing a time scale.

Proposal

The following proposal was made by T. Ikeda and T. Hattori of the Mizusawa Observatory:

I. *Publication of the results of the international latitude service*

1. Definitive results of the international latitude service since 1935.0 are eagerly desired to be published as soon as possible.

2. The preliminary values of x and y are desired to be published monthly as soon as possible. For this purpose, we are ready to send the calculated monthly latitude of Mizusawa, together with the observation book, each month by receiving beforehand from the Central Bureau the adopted constants which are necessary for the reduction of latitude, i.e. the micrometer value, level value and so on.

II. *Unification of a manner of observation and the miscellaneous*

It is desirable that the Central Bureau of the International Latitude Service should unify the equipments and manner of observation of the meteorological elements which has been carried out as a subsidiary observation. The unification is desirable to be made under a special consideration so as to gain standardized data throughout all the stations which are considered to be advantageous to the investigation on the effect of meteorological condition on the observed latitude.

From our own data at Mizusawa, we obtained some relations that exist between the observed latitudes and the meteorological elements which have been observed for many years. Observed elements at this observatory are as follows:

1. Room temperature at the two points in the meridian of the telescope, one north and the other south. Thermometers of Fuess type with $0^{\circ}2$ C. graduation are provided near the inside wall of the hut. Height of the thermometer is about equal to that of the objective of the telescope.
2. Atmospheric temperature at the two points outside the observing hut, namely at the north and at the south of the hut. Height of the thermometer is about 1·70 m. above the ground surface.
3. Wind velocity and its direction near the observing hut.
4. Atmospheric pressure near the telescope.
5. Telescope temperature.

General Remarks

In accordance with a resolution adopted at the 1952 assembly of the I.A.U., a meeting of interested persons was held at Rome in September 1954, at the time of the Assembly of the I.U.G.G., for the purpose of considering questions concerned with the determination of the variation of latitude. The results of the discussion will be reported and given further consideration at Dublin. One subject considered was the observing programme for the international stations. There was also discussion of the problem of using the results of latitude determinations made with the newer instruments.

The remarks of the Astronomer Royal in regard to the uncertain screw values of the old zenith telescopes, and the findings of Soviet astronomers in regard to the effects of erroneous screw values at Caloforte, Mizusawa, and Ukiah, both emphasize the need for improvement in those instruments. Moreover, now that latitude determinations are being made in many places with various other instruments, the results obtained with these instruments should be utilized. It has been suggested that when new photographic zenith tubes and astrolabes are put into service, an effort should be made to locate them so as to form new chains. Moreover, it would seem that all latitude instruments, regardless of their location, should be made to contribute to the determination of polar motions, as well as to the investigation of latitude changes which cannot be ascribed to polar motion. These problems should receive careful consideration at the coming assembly at Dublin.

Paul Sollenberger
President of the Commission

Comptes rendus des Séances

Président intérimaire: M. Wm. Markowitz.

Secrétaire: M. P. Melchior.

Ie séance. 31 août 1955

Après une discussion rapide du Draft Report, le Président donne la parole au Prof. Tardi qui rend compte des travaux effectués à la réunion de Paris (février 1954) et au cours du Congrès de l'U.G.G.I. à Rome, septembre 1954, et d'une réunion tenue à Florence (Annexe 1).

Une commission restreinte s'occupera de la publication du vol. IX du Prof. Carnera. Elle est constituée par Sir Harold Spencer Jones, Président, MM. Tardi, Nicolini et Melchior.

Le Président met l'accent sur l'importance d'une connaissance à la fois rapide et précise des coordonnées du pôle pour les services horaires. Il pense que les instruments actuels du S.I.L. ne permettent pas d'obtenir une précision suffisante dans les délais très courts exigés par les services horaires.

A cet égard il note qu'une irrégularité dans le tracé provisoire de la polhodie (obtenue à partir des stations Mizusawa, Carloforte et Ukiah) s'est trouvée sensiblement réduite par l'introduction ultérieure mais tardive de Kitab. Après cette correction l'accord entre les courbes du S.I.L. et celles de Washington et Poulkovo paraît bon mais il subsiste un désaccord avec celles de Paris. Le Président invite alors le Dr Guinot à exposer le procédé de calcul utilisé à Paris. Il est remarquable qu'on y a constaté l'existence de différences systématiques entre groupes de 20 à 25 étoiles (FK3) de l'ordre de 0".30: on a dû en tenir compte pour le raccordement des groupes.

En distribuant son rapport le Prof. Cecchini note que le récent retard subi dans la publication des coordonnées du pôle est dû au fait que trois stations seulement ayant communiqué leurs observations, il a dû se livrer à des vérifications détaillées des calculs relatifs à la période perturbée de 1954,5–1955,0.

Une sous-commission est désignée pour préparer les résolutions.

Le Prof. J. Witkowski intervient pour signaler la création d'une nouvelle station de latitudes en Pologne située à Borowiec ($\phi = 52° 16' 54''$, $\lambda = 1^h 08^m 20^s$ E.). On y observera aussi bien les variations d'azimut que de latitude.

IIe séance. 1 septembre 1955

Le Prof. Cecchini constate que l'on a actuellement tendance à attribuer les écarts entre les observations de stations individuelles et les co-ordonnées publiées par le S.I.L. à des imperfections de ce Service. Une telle interprétation est inexacte car les variations de latitude observées en un point sont la résultante d'un effet polaire (lié directement aux co-ordonnées x, y) et d'un effet non polaire de caractère annuel (de la même nature que le terme z de Kimura) dont l'amplitude peut être considérable. La présence de ce deuxième effet peut causer d'appréciables changements de phase et d'amplitude par rapport aux courbes calculées à partir des données du S.I.L. et ceci est indépendant de la précision intrinsèque des observations. Il estime que quelques centaines d'observations faites dans un observatoire isolé ne peuvent constituer un contrôle sérieux des 48.000 mesures discutées par le Bureau Central de 1949 à 1954.

Sur la figure ci-jointe représentant la polhodie de 1949,0 à 1955,4 on peut relever une curieuse anomalie entre 1954,6 et 1955,0. La courbe 1954,0–1955,0 a été calculée de deux manières:

(1) en admettant les valeurs provisoires des pas de vis des micromètres (courbes en pointillés);

(2) en adoptant les valeurs améliorées de ces pas de vis (différant notablement à Carloforte). L'anomalie tend alors à s'estomper (courbe en trait plein).

Sir Harold Spencer Jones s'étonne de ces changements du pas de vis à Carloforte et estime qu'une étude soigneuse en serait nécessaire. Il s'étonne également de leur répercussion sensible sur le tracé de la courbe.

Le Prof. Cecchini rappelle que le programme ayant duré 20 ans, les conditions de compensation des mesures micromètriques à l'intérieur de chaque groupe ne sont plus du tout remplies et que cela peut donner des effets très sensibles.

Le Prof. Danjon émet l'hypothèse que les variations du pas de vis à Carloforte pourraient être dues à une relaxation de la trempe du verre de l'objectif ce qui ferait varier le coefficient de température. On a constaté à Paris des phénomènes de ce genre sur certains objectifs dont le verre n'avait pas subi un recuit suffisant.

Le Président fait part des propositions soumises par la sous-commission des résolutions qui sont adoptées à l'unanimité par la Commission (Annexe 2).

Le Dr Randic donne quelques détails sur la méthode de Pevzov dont la précision lui paraît un peu supérieure à celle de Talcott.

Le Dr Melchior rend compte de l'état d'avancement de la réobservation à Uccle des déclinaisons de toutes les étoiles utilisées par le S.I.L. depuis 1900: 6642 mesures de positions ont été faites et réduites à 1950,0. Les observations (5540) en position I sont

pratiquement terminées et celles en position II sont entamées (1102). La précision d'une seule observation est de $\pm 0''.267$ (e.q.m.). Les positions définitives seront conclues à partir de 12 observations. On espère terminer ce travail pour le début de l'Année géophysique.

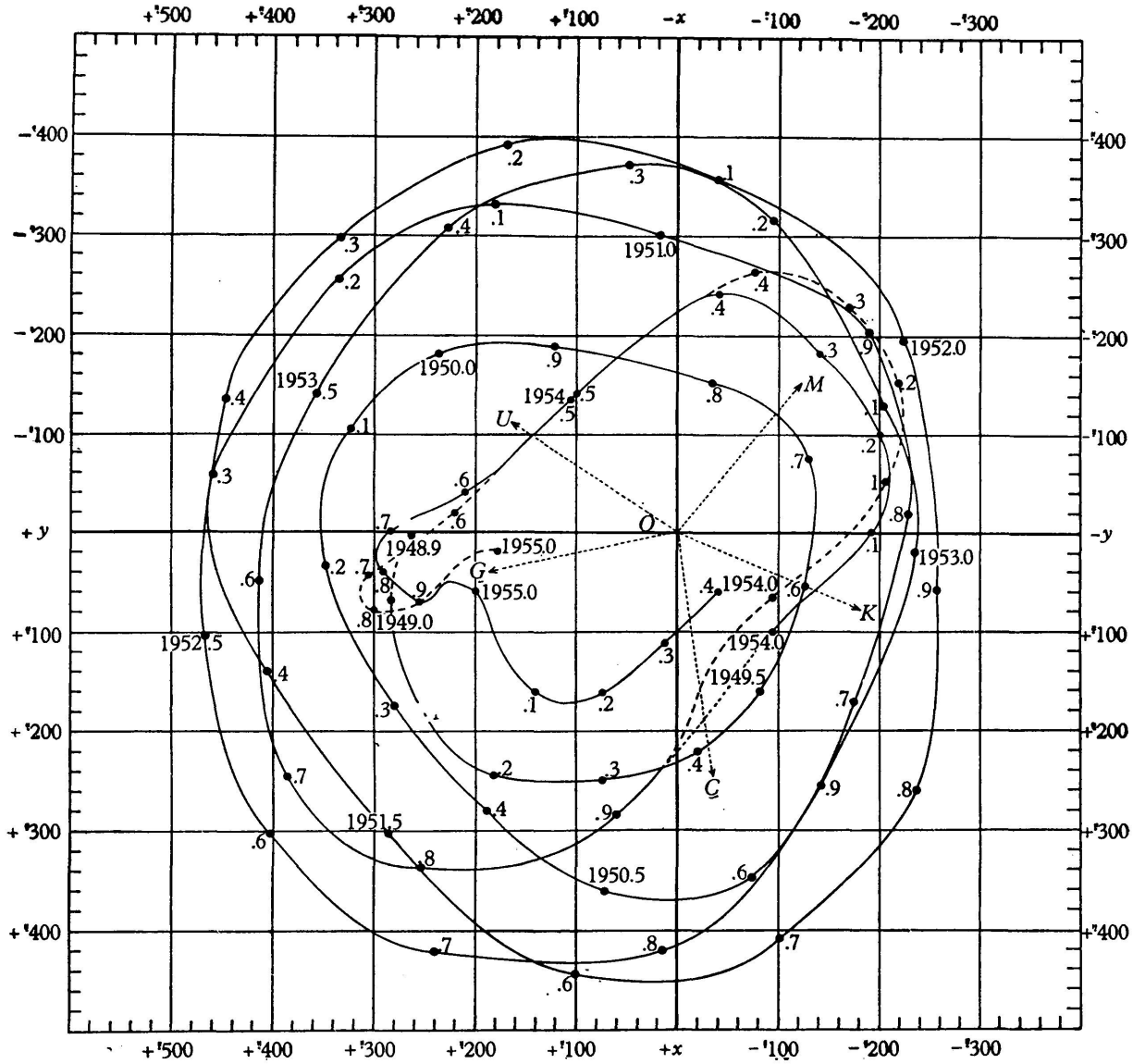

Fig. 1. Polhode derived from observations made by stations of the International Latitude Service in the northern hemisphere, 1948.90 to 1955.4. The origin represents the barycentre of the polhode of 1900–11, on the system of Wanach.

Annexe 1

Rapport présenté par M. Tardi

Sous l'égide de l'Association Internationale de Géodésie, il a été tenu en 1954, deux réunions internationales s'occupant du problème de la variation des latitudes:

La première (réunion préalable) à Paris du 1–4 février 1954 groupant plus spécialement des astronomes de l'Europe occidentale;

La deuxième à Rome en septembre 1954 à propos de l'Assemblée générale de U.G.G.I. était prévue par une résolution de l'U.A.I. prise en 1952 et doit être considérée comme une réunion commune U.A.I.–U.G.G.I. De nombreux astronomes y ont assisté.

Les deux réunions ont été présidées par M. Bourgeois, Directeur de l'Observatoire d'Uccle.

Le Compte rendu détaillé est en cours de publication dans le prochain numéro du *Bulletin Géodésique*, qui aurait dû paraître avant Dublin mais qui est en retard chez l'imprimeur. Ce numéro sera adressé gratuitement à *tous* les membres de la Commission 19.

Réunion de Paris de février 1954

Les points examinés ont été les suivants:

(1) Conditions de fonctionnement actuel du Bureau Central du S.I.L. et moyens de l'améliorer.

(2) Possibilité d'inclure le Bureau Central dans une Fédération des services permanents d'astronomie, géodésie et géophysique, patronnée par l'U.N.E.S.C.O. (augmentation sensible des ressources).

(3) Possibilité de déterminer les $\Delta\phi$ par des observations faites en des observatoires isolés différents de ceux du S.I.L.

(4) Equipement et organisation des stations actuelles. Améliorations de détail proposées pour les instruments en service (distance focale de 130 à 175 cm.—ouverture de 108 à 150 mm. —pas de vis de 40″ à 30″—lecture photographique des tambours et des niveaux).

(5) Présentation du nouvel astrolabe impersonnel de Danjon—résultats des séries obtenues à Paris. Comparaison avec la composante de $\Delta\phi$ donnée par le S.I.L.

(6) Introduction des mesures de variations d'azimut.

(7) Conditions d'utilisation de la polhodie par les services horaires nationaux et internationaux.

(8) Publication du vol. IX des résultats définitifs.

(9) Synthèse de raccordement des diverses polhodies.

(10) Préparation d'un catalogue amélioré des observations (circulaire envoyée dans les différents pays).

Réunion de Rome—septembre 1954

(1) On y a arrêté le nouveau programme d'observation, après réunion d'un sous-comité présidé par Sir Harold Spencer Jones. Ce programme est entré en application en janvier 1955. Les observations de déclinaisons des étoiles de ce catalogue sont faites à Uccle.

(2) On est revenu sur la question de l'utilisation des observatoires isolés concurremment avec ceux des stations spécialisées du S.I.L. et on a commencé à évoquer la substitution des premiers aux seconds.

(3) On a repris la question de l'amélioration aux instruments actuels. A signaler une communication de M. Markowitz qui commence ainsi 'Je pense que la modification des instruments actuels n'est pas rendable'. Suivant des propositions concrètes de M. Markowitz.

(4) On a entériné le rapport général donné par M. Cecchini: 1952,0–1954,5.

(5) On a adopté en particulier les deux résolutions ci-après:

(*a*) Ne rien changer à l'organisation actuelle du S.I.L. jusqu'après l'Année Géophysique.

(*b*) L'utilisation *au cours de cette dernière*, en marge du S.I.L., de PZT et d'astrolabes Danjon, un PZT étant utilisé suivant le programme présenté par les astronomes russes.

(6) On a enregistré une communication importante de l'Observatoire de Poulkovo sur les 50 années d'observations qui y ont été effectuées au zénith-télescope.

(7) On a à nouveau discuté des conditions d'utilisation des résultats de $\Delta\phi$ pour les services horaires nationaux et internationaux.

(8) Enfin, on a reparlé de la publication du vol. IX.

Annexe 2

Recommendations

(*a*) In view of the fact that several PZT's and an astrolabe of Danjon are now in operation, and that the number of these instruments in service will shortly be increased, it is recommended that:

(1) Chains of PZT's and astrolabes shall be established, and the stations comprising each chain shall have nearly the same latitude.

(2) The stations of each chain shall observe the same stars during the same nights as nearly as possible.

(*b*) In view of the fact that the PZT's at Washington and Mizusawa are entering into a joint programme of observation it is strongly recommended that a third PZT be established in Italy in order to complete the chain.

(*c*) In view of the necessity for the prompt determination of the motion of the pole for use in the determination of time it is recommended that a rapid service be established.

(1) The latitude results from the PZT's, the astrolabes, and from all other suitable instruments where the observatory concerned wishes to co-operate, will be sent each week to the Director of the Central Bureau, Pino Torinese (Torino) Italy.

(2) The results sent shall be for the previous week. A report will be sent even if no observations are obtained.

(3) The Director of the Central Bureau shall combine these results so as to obtain a smoothed motion of the pole. He shall forward his results to the Director of the Bureau International de l'Heure each week.

(4) The Director of the Central Bureau shall furnish about once a month, to those desiring them, summaries of the original latitude results described in section (1).

(*d*) Commission 19 directs a sub-commission to work out, in co-operation with the Italian Geodetic Commission, the details of presentation of vol. IX of the definitive results of the International Latitude Service. The members of this sub-commission are Sir Harold Spencer Jones, president, Prof. Tardi, Prof. Nicolini, and Dr Melchior.

The Commission notes with satisfaction that Prof. Nicolini has agreed to aid Prof. Carnera in the organizing of this publication. The text will be in Italian, with a substantial presentation in English, which will be prepared initially by Prof. Nicolini.

The Commission greatly desires that the second part of the publication, for the years 1942–48, shall be finished as rapidly as possible by Prof. Carnera with the aid of Prof. Nicolini. The Italian Geodetic Commission is kindly requested to inform Commission 19 as soon as possible of the amount of the supplementary funds which will have to be requested from the relevant organizations to ensure publication of the second volume, taking into account the funds that might remain available from those presently allocated.

Resolution

Commission 19 notes with satisfaction the announcement that the first part of vol. IX of the definitive results of the International Latitude Service (years 1935–41) prepared by Prof. Carnera is ready for publication.

The Commission asks the Executive Committee of the Union to place at its disposal the sum of 2613 dollars already voted for this publication by the General Assembly at Zürich (1948) but not yet furnished. This sum would be turned over to the Italian Geodetic Commission which is willing to undertake the details of this publication in collaboration with Prof. Carnera and Prof. Nicolini.

The second part of this publication (1941–48) will be sent to the printer as soon as possible. An estimate of the cost of the whole of the two parts will be submitted when desired to the Executive Committee.

Annexe 3

Nouveau programme adopté par les stations internationales boréales le 8 janvier 1955

En accord avec les décisions prises durant la Xe Assemblée Générale de l'U.G.G.I. tenue à Rome du 14 au 25 septembre 1954, la date du changement de programme dans les stations boréales a été fixée au 6 janvier 1955.

Le nouveau programme se compose encore de 12 groupes comprenant chacun 6 couples d'étoiles et couvrant 2h. d'ascension droite, mais les associations successives de groupes formant la combinaison en chaîne ne sont plus de deux groupes par nuit mais de trois groupes successifs couvrant donc six heures d'observation chaque nuit. La durée d'observation est la même pour tous les groupes et la distribution moyenne est symétrique par rapport à minuit.

Dates	Combinaisons de Groupes
6 janvier–5 février	IV–V–VI
6 février–6 mars	V–VI–VII
7 mars–6 avril	VI–VII–VIII
7 avril–6 mai	VII–VIII–IX
7 mai–6 juin	VIII–IX–X
7 juin–6 juillet	IX–X–XI
7 juillet–5 août	X–XI–XII
6 août–5 septembre	XI–XII–I
6 septembre–5 octobre	XII–I–II
6 octobre–5 novembre	I–II–III
6 novembre–5 décembre	II–III–IV
6 décembre–5 janvier	III–IV–V

Les observations des trois groupes d'une même nuit devront être faites par le même observateur.

Choix des étoiles

Les critères adoptés pour former les differents groupes sont les suivants, rangés par ordre de préséance:

(1) Les étoiles choisies appartiennent toutes au *General Catalogue* de Boss.

(2) On réalisera la compensation la plus parfaite possible des mesures micrométriques à l'intérieur de chaque groupe (cf. tableau ci-dessous) pour la date moyenne d'utilisation du catalogue.

(3) On conservera autant que possible les paires des anciens catalogues et même, prises individuellement des étoiles ayant appartenu à ces paires.

(4) On ne dépassera pas la magnitude 7·0. On ménagera un intervalle d'au moins 5 minutes entre les temps de passage de deux étoiles consécutives. On ne s'éloignera pas de plus de 20° du zénith. On évitera les étoiles doubles.

Il est bien évident qu'étant donné l'importance primordiale des critères 2 et 3 les critères 4 n'ont pas toujours pu être rigoureusement observés.

On a admis que la durée minimum d'utilisation d'un catalogue au service international des latitudes était de 12 ans: la date moyenne admise est donc 1961, mais les observations pourront être poursuivies sans trop grand inconvénient pendant 19 ans. Pour 1961, les compensations sont réalisées dans les limites ci-dessous:

Groupe I	−2′ 14″	Groupe VII	−0′ 6″
II	+2′ 31″	VIII	+0′ 25″
III	+2′ 26″	IX	−0′ 1″
IV	+1′ 16″	X	+3′ 3″
V	+1′ 22″	XI	−2′ 2″
VI	+2′ 59″	XII	−3′ 51″

Enfin, il est très important de noter que suivant une suggestion très pertinente des astronomes russes on a centré les différents groupes non plus sur les heures impaires mais sur les heures paires. Ceci aura l'avantage appréciable de conserver inchangés dans leur structure les groupes IV et X centrés respectivement sur 6 h. et 18 h. d'ascension droite.

Parmi les 72 couples du programme:

10 ont été observés depuis	1899
13	1906
17	1912
18	1922
34	1935

Parmi les 144 étoiles, 59 sont introduites pour la première fois et 26 couples seulement sont formés exclusivement d'étoiles nouvelles.

L'Observatoire royal de Belgique a accepté de joindre ces nouvelles étoiles à la liste des étoiles précédemment utilisées et dont il assure la réobservation des déclinaisons dans le système FK3.

Annexe 4

Rapport sur la réobservation des déclinaisons des étoiles du Service International des Latitudes à l'Observatoire royal de Belgique

Par Gilbert Becq *et* Paul J. Melchior

Nous avons décrit le but de la réobservation de ces étoiles ainsi que l'instrument et la méthode appliquée dans un rapport présenté au Congrès de l'U.G.G.I. à Rome (septembre 1954).

Nous nous bornerons donc ici à indiquer l'état d'avancement de ce travail et à rappeler quelques données essentielles relatives à la précision des mesures.

Le catalogue d'étoiles adopté en 1952 ne comprenait pas les étoiles du nouveau programme à adopter par les stations internationales en 1955.

Fin 1954, nous y avons ajouté 32 étoiles nouvelles figurant dans le nouveau programme et ceci a nécessité la poursuite des observations en position I qui étaient presque terminées pour toutes les autres étoiles.

Les observations en position II ont débuté fin mars 1955. Elles peuvent être menées rapidement grâce à l'octroi d'un subside par l'Académie Royale de Belgique (Fondation De Potter).

A la date du 15 août 1955, on avait mesuré:

En position I: 5.540 positions dont 3.788 d'étoiles du catalogue et 2.105 de fondamentales (FK3). A noter que 373 observations se rapportent à des étoiles communes au catalogue et au FK3.

En position II: 1.102 positions dont 848 d'étoiles du catalogue et 331 de fondamentales (FK3), 77 observations se rapportant à des étoiles communes.

La réduction a impliqué la mesure micrométrique visuelle de 53.602 images photographiques du cercle (comportant la lecture du trait supérieur aussi bien que du trait inférieur).

La précision des mésures peut être caractérisée par les résultats suivants:

erreur quadratique moyenne sur une position: $\pm 0''.267$
erreur moyenne de la lecture du cercle (16 mesures): $\pm 0''.127$
erreur moyenne du pointé micrométrique (5 à 7 pointés): $\pm 0''.125$

l'erreur du zéro est établie à partir de 15 fondamentales en moyenne.

La position conclue sera la moyenne d'au moins 12 positions observées ce qui donnera une erreur moyenne de $\pm 0''.077$.

On trouvera d'autres détails sur ce programme dans les publications suivantes:

Luigi Carnera. Über einen Meridiankreis neuerer Konstruktion der Askania (*Mem. Soc. Astr. Italiana*, vol. viii, 4, 1935 ou *Osserv. Astr. Capodimonte Contr. Astr.* ii, no. 6).

Mario Castellano et Paul J. Melchior. Sur un effet systématique dans l'enregistrement photographique de la position des graduations d'un cercle méridien (*Acad. R. Belg.* xxxviii, pp. 1235–40, 1953 ou *Communications Observ. R. Belg.* no. 55).

Gilbert Becq et Paul J. Melchior. Etude préliminaire des erreurs de division d'un cercle méridien à l'aide d'observations d'étoiles fondamentales (*Acad. R. Belg.* xli, pp. 457–66, 1955).

Paul J. Melchior. Déplacement séculaire du pôle moyen et catalogues d'étoiles (*Comm. Obs. R. Belg.* no. 79, 1955).