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8a. SOUS-COMMISSION DES CATALOGUES PHOTOGRAPHIQUES  
D'ÉTOILES JUSQU'À LA 9-ME GRANDEUR

PRÉSIDENT: Professor D. Brouwer, Director of the Yale University Observatory, Box 2023  
Yale Station, New Haven, Connecticut, U.S.A.

MEMBRES: Mlle Barney, A. N. Deutsch, Dieckvoss, Eckert, Fatchikhin, Mlle Hoffleit,  
Lourens, Scott, Vasilevskis, H. W. Wood.

PHOTOGRAPHIC CATALOGUE

*The AGK 3R program.* F. P. Scott, the chairman of the committee on the AGK 3R, reports that the AGK 3R program has progressed steadily since the latest report made to the Sub-Commission. The Paris Observatory was the first to finish its observations, in September 1960. The observatories at Bordeaux, Heidelberg, Ottawa, Pulkovo and Strasbourg have completed approximately 99% of their observations. The remaining observatories, at Babelsberg, Greenwich, Nikolaiev, and the two instruments at the United States Naval Observatory, will require until early in 1962 to complete their observations. The Lund Observatory, foreseeing that it would be difficult to meet its commitments on time, decided in March 1960 to withdraw from participation in the AGK 3R observing program. Of the 7658 stars in the Lund commitment, 3516 were added to the program of the Greenwich reversible transit at Herstmonceux, and 4142 to the program of the six-inch transit circle at the U.S. Naval Observatory. These additions increased the commitments of both instruments considerably; extra time will therefore be needed to meet them.

Since the inception of the program the U.S. Naval Observatory has served as a center for the computation of the reductions from apparent place to mean place for all stars observed in

connection with the program. All observers have made use of these services to some degree. As of 1 November 1960, over 340 000 such reductions had been made and returned to the observers.

*The AGK 3 photographic program.* W. Dieckvoss reports that the measurement of the plates taken for this program is making excellent progress. It is expected that the routine measurements will be completed by the end of 1961. There will then be available on punched cards the provisional proper motion components in right ascension and declination derived from the measurement of the AGK 2 and AGK 3 plates, as well as the data necessary for the transformation to the proper motion components that will correspond to the definitive plate solutions. For this final step the definitive AGK 3R positions of the reference stars will be required.

In relation to the reductions of the photographic positions, K. Lübeck of the Hamburger Sternwarte has begun a program of photographing a belt  $20^\circ$  wide along the northern Milky Way with the 360/440/630 mm Schmidt telescope of the Hamburger Sternwarte. The object of this undertaking is to obtain color indices for all AGK 2 stars with spectral type O through A5. The color indices are to be used as arguments for the color corrections for stars that show appreciable reddening.

*Astrometric standard fields.* At the Second Astrometric Conference held at Cincinnati in May 1959, Resolution 10 dealt with the desirability of establishing standard fields for the purpose of testing and comparing different instruments, initially two or three fields in declination  $+45^\circ$ . W. Dieckvoss reports that Kapteyn Areas 22,28,34 and 40 (all in declination  $45^\circ$ ) have been selected for this purpose.

#### PLANS FOR A SOUTHERN HEMISPHERE PROJECT

At the Moscow meeting of the IAU, Commission 8 appointed a committee consisting of Messrs. Dieckvoss, Scott, Stoy, Zverev, Wood and Brouwer (Chairman) to prepare detailed plans for a project for the southern hemisphere that should be as nearly as feasible equivalent to the AGK 3 project for the northern hemisphere.

At a conference held at the La Plata Observatory in November 1960, four of the six members of this committee were present (Dieckvoss and Wood did not participate). These four members arrived at the following provisional meridian-circle program for southern reference stars.

The Pulkovo Observatory Southern Station, in collaboration with the Cerro Calan Observatory near Santiago (Chile), to observe the reference stars in declinations  $-25^\circ$  to  $-90^\circ$ .

The Cape Observatory to observe the reference stars in declinations  $-30^\circ$  to  $-90^\circ$ . This program is to be carried out in zones during the next eight or ten years.

The La Plata Observatory to observe the reference stars in declinations  $-20^\circ$  to  $-45^\circ$ , plus selected stars  $-15^\circ$  to  $-20^\circ$ .

The United States Naval Observatory to observe the reference stars in declinations  $0^\circ$  to  $-20^\circ$ .

H. S. Spigl, Director of the Government Observatory at Perth, Western Australia, has offered to participate in the program after necessary improvements to the instrument can be introduced.

C. U. Cesco, Director of the Observatory at San Juan, Argentina, also wishes to participate in the program with the Cordoba meridian circle that has been moved to San Juan and is being erected on the new site.

Finally, J. Abdala, Director of the Cagigal Observatory at Caracas, Venezuela, reports that he hopes to have a new meridian circle installed at a suitable site in Venezuela.

It is proposed that both at Perth and at San Juan selected lists in declinations  $0^{\circ}$  to  $-90^{\circ}$  be observed, and that the program at Caracas consist of a list in declinations  $+15^{\circ}$  to  $-50^{\circ}$ .

In addition, it is hoped that some northern observatories will wish to participate in observations north of  $-20^{\circ}$ . In particular it was suggested that the observatories at Bucharest, Nikolaiev, San Fernando and Tokyo may be urged to accept a share in the program. No steps toward this participation have been taken, except exploratory correspondence between Scott and Yasuda of the Tokyo Observatory.

The program will be discussed in further detail at the meeting of the Sub-Commission at Berkeley in August 1961, at which time some aspects of the tentative arrangements may have become more definite. At this meeting it will also be desirable to establish a time schedule for completion of the meridian observations of the reference stars. Tentatively, it has been suggested that the program should be completed by 1970.0.

It is evident that the proposed meridian-circle program for the southern hemisphere will not be as strong as the AGK 3R program for the northern hemisphere, simply because the number of available instruments in the southern hemisphere is so limited. For this reason two possibilities should be explored: (1) that of moving existing meridian circles temporarily or permanently from a northern location to a site in the southern hemisphere; (2) strengthening the meridian-circle program by suitable photographic observations. In connection with the latter possibility, reference is made to a communication by D. Brouwer on 'The use of a very wide-angle camera for catalogue work' (1) and also to the discussion following the presentation of this paper in which Dieckvoss and Danjon referred to an experiment by Baillaud and Couderc according to a plan proposed by Turner.

More recently, H. Eichhorn of the Van Vleck Observatory of Wesleyan University (2) has made a preliminary study of the possibility of strengthening meridian-circle positions with the aid of a series of strongly overlapping plates. It is intended to carry out such an experiment on a series of plates with fields  $10^{\circ} \times 10^{\circ}$ , centered at  $-90^{\circ}$ ,  $-85^{\circ}$ ,  $-80^{\circ}$ ,  $-75^{\circ}$ , that cover the polar cap south of  $-75^{\circ}$  with abundant overlapping. These plates were taken with a Yale camera at the Sydney Observatory by myself and members of the Sydney Observatory staff with epoch about 1956.0. The object of taking these plates was essentially the same as Eichhorn's. Dieckvoss writes on this topic:

'I understood that you had experimented with the reduction of plates in connection with ideas expressed by H. Eichhorn. You aimed at a better use of the inherent precision of photographic positions in order to take some of the heavy burden of meridian circle observers off their programs for reference star positions. Just for covering the southern hemisphere with positions of stars down to the ninth magnitude a method that could spare say 70% of meridian work would very much go in the direction of diminishing the time for completion of the catalogue. My own tests of Eichhorn's suggestions (in letters and in a manuscript ready for publication) with the IBM 650 of Hamburg University went very well. Unfortunately I had taken as reference positions GC positions and proper motions only. Therefore the results were unsatisfactory as to the final mean errors. I am sure that your own experience will be in favor of such a method as Eichhorn's.

'I myself should like to discuss a modified solution of the task of enlarging the fields artificially. I am in favor of the other method you presented at the Dublin meeting of the IAU: To attach say four plates to a central plate. The four outlying plates would have their edges in the center of the central plate. The attachment by a large number of photographic positions, say 70 in each quadrant, would lead to a field four times the original field, and a smaller number of reference star positions could suffice and besides would give plate constants of higher precision and with smaller systematic errors.'

The agenda of the Berkeley meeting of the Sub-Commission may well include a discussion of this subject.

The Cape Observatory has already made a selection of reference stars for the zones  $-30^\circ$  to  $-64^\circ$ , and intends to continue this selection from  $-64^\circ$  to  $-90^\circ$ . These stars have a uniform distribution of one star per square degree. Fifty per cent of these selected stars conform as closely as possible to Zverev's criteria for the KSZ. Scott is augmenting the Zverev reference star list,  $0^\circ$  to  $-30^\circ$ , by the addition of other stars, mostly brighter, to bring its density nearer the list selected at the Cape Observatory. Scott also reports that the reference star list,  $-30^\circ$  to  $-64^\circ$ , selected at the Cape Observatory, is now being put on punched cards in anticipation of offering the same apparent to mean place reduction service to southern observers as the United States Naval Observatory is now giving the northern AGK 3R observers.

Concerning the photographic program for the southern hemisphere, Lourens reports for the Cape Observatory that this observatory intends to photograph the sky south of  $-30^\circ$  concurrently with the Cape program of observation of reference stars. Each zone will be photographed with half overlap in both right ascension and declination so that each star will be recorded on four plates or more. The order decided upon is: starting with  $-40^\circ$  to  $-52^\circ$ , then  $-30^\circ$  to  $-40^\circ$ , followed by  $-52^\circ$  to  $-64^\circ$ , and finally  $-64^\circ$  to  $-90^\circ$ .

The Cape Observatory has installed a new Taylor, Taylor and Hobson four-component wide-angle astrometric camera adjacent to the current wide-angle camera on the McClean mounting. The focal length is 81.2 in, aperture  $f/10$ . A focal plane filter is provided with maximum transmission to the red of  $5500 \text{ \AA}$  and no transmission to the blue of  $5000 \text{ \AA}$ .

H. W. Wood reports that the Sydney Observatory wishes to participate in the photographic program with its new Taylor, Taylor and Hobson lens which gives a scale of  $116''/\text{mm}$ . Initially his intention is to concentrate on the zones in declination  $-51^\circ$  to  $-65^\circ$ , which coincide with the Sydney Astrographic Catalogue zones.

The Yale Observatory hopes to undertake a photographic repetition of the zones  $0^\circ$  to  $-30^\circ$  and  $-65^\circ$  to  $-90^\circ$ .

An important aspect of the photographic program is the measurement and reduction of the plate material. Much will depend on the extent to which new efficient measuring machines will be available.

#### CURRENT WORK

The Royal Observatory at the Cape of Good Hope published *Cape Annals*, Vol. 20, containing the zones in declinations  $-56^\circ$  to  $-64^\circ$ . J. v. B. Lourens reports that the measurement for the zones  $-64^\circ$  to  $-80^\circ$  has been completed, and that the reductions and manuscript preparation are over fifty per cent completed. These zones will appear in Vol. 21. For the declinations between  $-80^\circ$  and  $-90^\circ$  the measurement is in progress. These zones will form Vol. 22. The supplementary photometric program for providing magnitudes and colors for the zone stars is keeping pace with the positional program. Spectral types for about 4000 stars, from  $-64^\circ$  to  $-90^\circ$ , which do not occur in the H.D. Catalogue, are being specially classified by Mrs. Margaret Mayall.

The Yale Observatory published (*Trans. Yale Univ. Obs.* 26, part II, and 27) a new catalogue for declinations  $+50^\circ$  to  $+60^\circ$ . The measurements were carried out with the automatic measuring machine at the Watson Scientific Computing Laboratory at New York City. The settings were made with the aid of a photo-electric bisecting device. The probable error of an average catalogue position, based on two plates, was found to be  $0''.085$ , compared with  $0''.105$

for Yale Catalogue positions obtained with the Yale Observatory measuring machine with bisection by eye. This evidence therefore indicates a remarkable gain in accuracy.

At the Yale Observatory the measurement of a zone  $-30^{\circ}$  to  $-40^{\circ}$  with epoch about 1956.0 is in progress with about fifty per cent of the measurements completed. At the Watson Scientific Computing Laboratory, in co-operation with the Yale Observatory, the measurement of plates in declinations  $-40^{\circ}$  to  $-50^{\circ}$  with epoch approximately 1942.0 is just beginning.

#### PROPER MOTIONS REFERRED TO DISTANT GALAXIES

Concerning the Lick Observatory program, reference can be made to the report of the Sub-Commission three years ago as well as to the contribution by Vasilevskis to the Cincinnati conference (3). This paper contains a presentation of the essential features included in the design of the automatic measuring machine that is being built for the Lick Observatory project by the Gaertner Scientific Corporation at Chicago.

I am happy to report that the Ford Foundation has made a grant to Yale University for the purpose of building an instrument equivalent to the Carnegie astrograph of the Lick Observatory for the purpose of extending the Lick proper-motion program to the south celestial pole. It is intended that the Observatories of Yale and Columbia Universities will jointly undertake the observing program. Two 20-inch four-element objectives, one calculated for blue and one for yellow light, have been ordered from the Perkin-Elmer Corporation. Negotiations concerning the construction of the mounting have not yet been concluded. Site studies are continuing in both Chile and Western Argentina.

A. Deutsch reports on further progress with the project of using astrographs of the Carte-du-Ciel type for the measurement of absolute proper motions of stars in fields that contain suitable galaxies. A final catalogue of 226 galaxies in 48 areas was published (4), while a preliminary catalogue of 1198 galaxies in 94 areas in declinations  $-25^{\circ}$  to  $-68^{\circ}$  was completed by Adelina Gutiérrez Alonso from observations made with the normal astrograph of the observatory at Santiago, Chile. Seven areas in declinations  $-68^{\circ}$  to  $-90^{\circ}$  were photographed by the Cape Observatory.

#### PHOTOGRAPHIC OBSERVATIONS OF KSZ STARS

At the Pulkovo Observatory a program of photographing fields centered on KSZ stars has been continued. With the normal astrograph of that observatory a series of observations of 240 fundamental stars, with two plates for each field, in declinations  $-5^{\circ}$  to  $+90^{\circ}$  was completed, and the list of these stars was published (5). A list of 70 KSZ stars in declinations  $-5^{\circ}$  to  $-25^{\circ}$  was compiled. These stars are to be observed principally at the observatories at Bucarest and Z6-S6. A selection of stars to be observed in declinations  $-25^{\circ}$  to  $-90^{\circ}$  is in progress.

Deutsch expresses the hope that observatories in the southern hemisphere with astrographs of the Carte-du-Ciel type, and especially also instruments of longer focal length, will participate in the program.

Finally, Deutsch notes the investigation by W. W. Podobed, D. N. Ponomarev and A. M. Mikisha on the comparison of the Bergedorf and Pulkovo catalogues of the AGK 2 polar region (6). A list of errata to the Pulkovo catalogue was compiled and published by the authors (7).

DIRK BROUWER  
*President of the Sub-Commission*

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