

COMMISSION 24: PHOTOGRAPHIC ASTROMETRY (ASTROMETRIE PHOTOGRAPHIQUE)

Report of Meetings on 22, 25, and 26 November 1985

PRESIDENT: W. Gliese

SECRETARY: J.L. Russell

Activities of Commission 24 at the XIX General Assembly consisted of three sessions concerned with matters specifically connected with Commission 24 itself, one Joint Meeting with Commission 8, participation in a Joint Meeting on "HIPPARCOS" (Commissions 7, 8, 24, 25, 33, 37) and in Joint Discussion I "Reference Frames" (Commissions 7, 8, 19, 20, 24, 31, 33, 40).

Business Meeting: 22 November

The President welcomed the members present at the meeting. He especially expressed his joy at seeing again Willem Luyten, who has been an active astronomer since before the founding of the IAU; with great pleasure the President welcomed also Kaj Strand, a successful member of the Commission on Parallaxes and Proper Motions (now Commission 24) for many decades.

The President called for a moment of silence to honour the memory of the members lost by death since the meeting at Patras: W. Dieckvoss, N.V. Fatchikhin, I.V. Gavrilov, D.J.K. O'Connell, N.E. Wagman.

The President announced that, as a result of the mailed ballots from the members of the Commission, the following names were proposed for the new officers for 1985-1988:

President: Arthur R. Upgren

Vice-President: William van Altena

Organising Committee: A.N. Argue, T.E. Corbin, Ch. de Veigt, W. Gliese, I.I. Kanaev, T.E. Lutz, J.D. Stock.

V.V. Lavdovskij resigned from IAU membership, and E. de Graeve has resigned as consultant.

The following were confirmed as new members of the commission: U. Bastian, N.M. Bronnikova, G.G. Douglass, D. Harwood, V.S. Kislyuk, J. Kovalevsky, L.A. Marschall, D.G. Monet, R.-Sh. Pan, M.A.C. Perryman, D. Quin, S. Roeser, H. Ruder, G.-Ch. Shi, J.-J. Wang, G.L. White, H. Wroblewski, S.M. Younis, X.-H. Zhou. In the following days Y. Requième, new President of Commission 8, applied for membership in Commission 24 and was announced to the General Secretary.

K.-G. Steinert and C.E. Lopez were proposed and approved as new Consultants of Commission 24.

The report on the Commission work 1981 to 1984 was approved with one addition - that after the termination of research at Sydney Observatory, not only the telescope and astrometric equipment was transferred to Macquarie University, but also the astrographic plates, which are in a fair state of preservation.

The Commission approved the following reports of its two Working Groups:

WORKING GROUP ON PARALLAX STANDARD STARS

A.R. Upgren, Chairman

The Working Group on Parallax Standard Stars reported no activity since the completion of the first part of its mission, the selection of the standard stars. The commission approved the continuation of the working group, giving it the responsibility to monitor all parallax programs and their observations of standard stars and regions. The working group will first determine the observations which each parallax program has made since the standard list was published. Upgren wished to be replaced as chairman but remain a member of the group, and he was replaced by Lutz.

WORKING GROUP ON OPTICAL-RADIO REFERENCE FRAME

Chr. de Veigt, Chairman

1. Introduction

Following the last IAU General Assembly 1982 in Patras, two meetings of the WG were held in 1985 at Washington (USNO 23.6.85) and Aussois/France (informal, during Hipparcos INCA conference 3.-6.6.85). An interim report of work status was given during IAU Symposium 109 (Astrometric Techniques, Gainesville/USA, January 1984) by the chairman (in press).

2. Report on WG activities

2.1 In fulfilment of the main task of the WG, to provide a candidate list of suitable objects for the construction of a future extragalactic reference frame, a catalog of 233 sources has been compiled and published in *Astronomy and Astrophysics* (Vol. 130, 191, 1984). Extensive further optical and radio observations however are necessary to improve the present data on source structure, photometry and astrometry in both domains. In addition more objects south of -40° declination are needed for homogeneous sky coverage.

The question of any revision and extension of the present list was discussed. In particular the problem of a selection of additional quasars near the galaxy candidates was addressed by the chairman. It was pointed out by the radio astronomers that any inclusion of additional (weaker than 1 Jy) sources could not be expected within the next few years, mainly because of the large amount of radio observations necessary for a detailed investigation of source structure and background confusion problems. It is estimated that about 900 sources down to 0.1 Jy may be available in principle.

The WG agreed that extensive work has to be concentrated now on detailed optical and radio investigations of the present list for many years to get full insight in the astrophysical and astrometric properties of the sources.

2.2 Radio Stars. During the last years great progress has been made to obtain precise astrometric results for radio stars both in the radio (VLA, VLBI) and optical domain. The WG agreed that radio stars will provide the most suitable link candidates to connect the present galactic and future extragalactic reference frames. Therefore the problem of providing a similar list for radio stars was discussed. It was agreed that no ad hoc list of optimally suitable candidates can be produced due to the very heterogeneous physical properties of radio star emission and related optical structure. More information is required. However, as a first step, a provisional list of about 50 radio stars has been compiled, based on the data provided mainly by the radio astronomers of the WG. The list is suggested to

First provisional List of Optical-Radio Star Candidates

Object	h	m	s	(1950.0)	°	'	"	Remarks
UU PSC	00	12	24.115		08	32	36.36	5)
Zeta And	00	44	40.968		23	59	43.95	
39 CET	01	14	03.932		-02	45	46.70	
Algol	03	04	54.360		40	45	52.46	3) 4) 5)
CC CAS	03	10	07.408		59	22	38.48	5)
UX ARI	03	23	33.150		28	32	29.0	1) 3) 5)
HR 1099	03	34	13.130		00	25	28.00	1) 3) 5)
b PER	04	14	28.585		50	10	27.09	2) 5)
RZ ERI	04	41	24.006		-10	46	29.31	
12 CAM	05	01	50.604		58	57	15.46	
HR 1890	05	32	53.307		-04	31	30.89	4)
SIG. ORI E	05	36	16.396		-02	37	17.58	4)
CHI 1 ORI	05	51	25.196		20	16	07.36	
ALPHA ORI	05	52	27.780		07	23	57.70	4) 5)
CQ AUR	06	00	39.261		31	19	51.10	
HD 50896	06	52	08.115		-23	51	51.74	2)
RY GEM	07	24	32.914		15	45	42.87	
KQ PUP	07	31	30.082		-14	24	51.94	2)
SIGMA GEM	07	40	11.382		29	00	22.55	5)
54 CAM	07	58	31.922		57	24	49.18	2) 5)
TY PYX	08	57	34.039		-27	37	10.53	5)
SAO 81134	09	57	13.283		24	47	36.76	4)
DM UMA	10	52	36.414		60	44	11.25	
RW UMA	11	38	04.982		52	16	31.31	
SS BOO	12	02	04.827		38	56	34.42	
DK DRA	12	13	21.347		72	49	45.09	4)
RS CVN	13	08	17.734		36	12	01.33	2) 5)
FK COM	13	28	24.641		24	29	24.48	2)
HR 5110	13	32	34.145		37	26	16.19	2) 3) 5)
RV LIB	14	33	01.226		-17	49	07.46	
RW CRB	15	37	12.525		29	47	01.01	
SIG CRB A	16	12	47.632		33	59	00.57	2) 3) 5)
ALP SCO A	16	26	20.201		-26	19	22.42	2) 5)
WW DRA	16	38	21.839		60	47	49.66	
EPS UMI	16	51	00.905		82	07	21.54	
Z HER	17	55	51.297		15	08	33.74	2)
9 SGR	18	00	48.402		-24	21	48.72	2) 5)
FR SCT	18	20	34.026		-12	42	27.74	2)
BETA LYR	18	48	13.932		33	18	12.32	2) 5)
U SGE	19	16	37.057		19	31	04.09	4)
CYG X-1	19	56	28.870		35	03	55.00	3) 5)
V444 CYG	20	17	42.591		38	34	24.25	4)
BD+433571	20	18	46.686		43	41	42.93	2) 5)
CYG OB2 5	20	30	34.838		41	08	03.91	2) 5)
ER VUL	21	00	16.429		27	36	33.36	
AD CAP	21	37	03.793		-16	13	58.52	
VV CEP	21	55	14.413		63	23	13.41	2)
RT LAC	21	59	28.742		43	38	56.48	2) 5)
AR LAC	22	06	39.256		45	29	47.29	2) 3) 5)
SZ PSC	23	10	50.602		02	24	10.83	2) 3) 5)
LAMB. AND	23	35	06.520		46	11	13.82	3) 5)
II PEG	23	52	30.500		28	21	19.00	2) 5)

References

- 1) Johnston, Wade, Florkowski, de Vegt (1985), AJ 90, 1343
- 2) Florkowski, Johnston, Wade, de Vegt: Stellar Radio Astrometry I, AJ 90, 2381, 1985
de Vegt, Florkowski, Johnston, Wade: Stellar Radio Astrometry II, AJ 90, 2387, 1985
Johnston, de Vegt, Florkowski, Wade: Stellar Radio Astrometry III, AJ 90, 2390, 1985
- 3) Lestrade, Preston, Mutel, Niell, Phillips (1985) HIPPARCOS Second FAST Thinkshop p.87
- 4) Johnston et al., to be published
- 5) de Vegt, (1982) Abh.HS X,3, p.119

undergo changes. Especially south of -40° declination detailed information is lacking; special instrumental and institutional support is urgently needed.

2.3 WG-activities with Hipparcos. Most of the WG-members are involved now in the Hipparcos project, contributing especially to the problem of the ERL (Hipparcos subgroup 2130, Argue, task leader). Extragalactic candidate sources for the ER have been selected almost entirely from the WG candidate catalog; a similar list of radio stars is under investigation. Extensive detailed studies of optical and radio source structure have been started and in particular, the determination of precise radio positions of stars relative to the extragalactic VLBI-based reference frame is in progress, using the VLA and different VLBI-configurations.

3. Future activities

The WG agreed that a substantial improvement of the present candidate list or similar work on a list of radio stars can be achieved only on a longer time scale, due to expected slow accumulation of high quality observational data both in the optical and radio domain. In addition to the general problem of the extragalactic reference frame needs more evaluation.

Especially radio work on the southern hemisphere needs immediate support to avoid serious unbalance on the global distribution of reference frame sources. It is expected that our Australian colleagues will be heavily engaged in this difficult task. Furthermore it is obvious that the successful construction of a new extragalactic reference frame is only possible if a detailed knowledge of the physical nature of the source candidate is available.

To improve this situation the WG strongly suggests an IAU Colloquium or Symposium in spring 1988 which would bring together astrometrists and experts from astrophysics to discuss both problems of the reference frame and the physical nature of the reference "point" sources.

Finally, for the coming three year period the WG suggests Dr. D.L. Jauncey, CSIRO, for chairmanship.

For the coming triennial period two IAU meetings are proposed which will be sponsored by Commission 24:

1. A symposium to be held 1987 at Paris as Centenary of the Carte du Ciel/ Astrogaphic Catalogue organised by the Observatoire de Paris (S. Débarbat) and Commissions 24 and 41 (History of Astronomy). After long discussion this meeting was approved as Symposium No. 133 "Mapping the Sky - Past Heritage and Future Directions", proposed date in the first week of June 1987 at Paris.

2. J. Dommanget proposed a Colloquium "Wide Components in Double and Multiple Systems" to be held at Brussels in June 1987. It was been approved also by the IAU as Colloquium No.97.

The question of the name of Commission 24 was discussed again, without any decision for a change.

A recommendation was made and accepted by the commission that authors of future publications containing trigonometric parallax results make every effort to quote all references containing previous trigonometric parallaxes published since the closing date of the Fourth Edition of the General Catalogue of Trigonometric Stellar Parallaxes, currently being completed at Yale. This practice will facilitate the work of data acquisition and compilation in the future.

Scientific Meeting: Miscellaneous: 22 November

The first scientific meeting was planned with the title "Astrographic Catalogue Work". However, as the proposed Chairman was not able to attend the General Assembly, no program was available.

The President reported on the questionnaire by C. Jaschek, concerning the Astrographic Catalogue (AC) and the Carte du Ciel (CdC) in CDS Bull. 27, 197 (1984), CDS Bull. 28, 169 (1985) and CDS Bull. 29, 61 (1985) and he read the conclusions drawn by Jaschek from the answers he had received. Westerhout supplemented Jaschek's statement, that the only large effort to get the published measures onto magnetic tape was the one by Lacroute for all of the French zones, by announcing that the USNO has been working to get all of the other zones onto tape.

As several observatories have already started programs which can be regarded as a revival of AC work, the Symposium No.133 at Paris 1987 will certainly become a fruitful meeting.

The following papers were presented during the meeting:

J. Russell: Guide Star Catalog for the Space Telescope, currently being compiled at STScI, is based on Palomar and UK Schmidt survey plates. Each plate is digitized into a 14 000 by 14 000 grid of 25 micrometer pixels. Star positions are centroided and reduced with a 10 plate constant model in each coordinate. The catalog will be complete to at least 14th mag, with relative accuracy of 0.25 arcsec and 0.15 mag and absolute accuracy of 2 arcsec and 0.7 mag. This catalog of about 20 million positions, magnitudes and stellar/non-stellar classifications will be published in 1987-88. At the time of the General Assembly nearly half of the 1500 plates had been scanned and 10% had been completely processed and cataloged.

F. Ghigo, R.M. Humphreys, and R. Landau: Description and First Results of the Redeveloped Automatic Plate Scanner at the University of Minnesota. A redevelopment of the Automatic Plate Scanner allows measurement of a pair of the sky survey sized (35 cm square) plates in 2 1/2 hours. The repeatability of position measurements is 1-2 micrometers. Stellar magnitudes can be calibrated to an accuracy of 0^m.1 or better. The machine is available for use by the astronomical community.

H.G. Walter: A Data Base of Radio Stars for the Extragalactic Link. Radio emission of stars provides the basis for relating directly the optical and radio reference frames. An inventory of radio star data is presented and its suitability for frame linkage is examined, taking account the HIPPARCOS astrometric space mission.

G.L. White and D.L. Jauncey: Astrometric work on the Southern Optical-Radio Tie Frame. A catalogue of 101 quasars south of declination -30° has been prepared for

possible inclusion in the inertial reference frame. Accurate radio positions (at the 0.1 arcsec level) and optical positions (~ 0.2 arcsec) have been measured for a small number of these sources. This project is continuing.

N.V. Kharchenko, A.B. Onegina, S.P. Rybka, and A.I. Yatsenko: At Kiev-Golosevo proper motions of about 20 000 stars in 100 sky areas were obtained with respect to galaxies. The s.e. of a proper motion is $\pm 0''.008$. Sources of errors were studied and the magnitude equation was determined.

Joint Meeting of Commissions 8 and 24: Common Interests 25:November

The members of both commissions met together. Two resolutions were discussed. However, since the resolutions had been introduced for Commission 8 only, the discussion and voting on them is thus included in the Commission 8 report.

The proposed meetings in Paris, Brussels, and Beograd were discussed. The final meeting endorsements are summarized elsewhere in this and the Comm. 8 report.

The matter of renaming both commissions was discussed. There was general agreement that both commissions have names which do not reflect completely their current interests and that it was a good idea to discuss the names at the same time because both are "astrometric" commissions. However, the session concluded with no consensus on new names.

Scientific Meeting: Parallaxes and Proper Motions

27 November

Chairman Strand opened the session remembering that thirty years ago the current president, W. Gliese, attended his first meeting of the Commission "Parallaxes and Proper Motions" at which time Strand became its president. He pointed to the great progress made in these past decades; the following papers will demonstrate the situation and status in 1985.

W.F. van Altena: The new General Catalogue of Trigonometric Stellar Parallaxes. The new edition of the Yale Parallax Catalogue contains the relative parallaxes, average reference star magnitudes, proper motions and source of publication for 13 253 parallax determinations of 7 562 systems through early 1985. In addition weighted mean absolute parallaxes are given and UBV photoelectric photometry, MK spectral types and numerous cross identifications are listed when available. Printed versions of the Catalogue will be available through the Yale University Observatory in 1986. Preliminary results of a study at Yale of the determination of absolute parallaxes with respect to faint galaxies indicate a peak accuracy of $\pm 0''.002$ (s.e.) for stars as faint as $m \sim 19$.

G. Westerhout: CCD Parallax Work at Flagstaff. A CCD array is being used with the 1.55 m USNO Flagstaff Astrometric Reflector. There are 160 stars on the program. Initial results on about 20 stars show that the reference frame (5-12 stars) is better than 1 mas; stars with good reference frames and good corrections for differential colour refraction have parallax accuracies of 1 mas. Future work includes installation of a Tectronics 2048 \times 2048 CCD and on-line data reduction equipment. It is expected that 1 mas for faint and bright stars will be routine products of the USNO at a rate of 100⁺ parallaxes per year.

W.J. Luyten: Results of the Proper Motion Surveys. Luyten summarized his proper motion surveys, the Bruce Survey on Harvard plates and the Palomar Survey. The published proper motions from both surveys amount to about 200 000, while data for another 250 000 are ready on tape to be sent to the NASA Goddard Space Center at Greenbelt/Maryland. Luyten has begun handblinking some ESO Schmidt pairs of

plates in the South.

A.R. Upgren: New Results on Nearby Dwarf Stars. Parallaxes and proper motions obtained by the Van Vleck Observatory for several hundred lower main-sequence stars are limited to the brighter dwarfs of the McCormick lists because only these have radial velocities which allow space motions to be determined. It is now shown that this selection does not introduce a bias in the transverse velocities of the Van Vleck program stars. Thus they are representative of the McCormick stars in general, as well as those of the Catalogue of Nearby Stars. They are likely to be representative of the solar neighbourhood as well.

W. Gliese and H. Jahreiss: A Third Catalogue of Nearby Stars will include all stars known to be nearer than 25 parsecs. A 1984 preliminary version of the new Yale Catalogue of Trigonometric Stellar Parallaxes contained nearly 2 000 objects with parallaxes exceeding $0''.0394$. From luminosity determinations based on spectral type and/or colour, about 700 more stars can be added. Probably the new Yale Catalogue will not change significantly the currently used spectral type-luminosity and colour-luminosity relations.

C.A. Murray: Proper Motions and Parallaxes with the UK Schmidt Telescope. A catalogue of positions, proper motions and parallaxes for 6125 stars brighter than $B = 17.5$ in an area of 20 square degrees near the South Galactic Pole, has been derived from plates taken between 1975 and 1981 with the UK Schmidt-Telescope and measured on the GALAXY machine at RGO. The zero point of proper motions has been deduced from the observed parallactic motion and this has also been used to calibrate the trigonometric parallaxes for magnitude dependent errors. The average external error of a proper motion component and parallax is about $\pm 0''.015$.

Finally the President read to the Commission members an abstract about a future project by de Vegt: An All Sky High Precision Astrometric Catalog Project down to the 17th Magnitude Using an Integrated High Speed Telescope-Measuring System.