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ASTROMETRY WITH AC AND CDC PLATES OF CÓRDOBA: EVALUATION OF ERRORS

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RESUMEN

En este trabajo se presenta el método desarrollado para la identificación de estrellas en placas Carte du Ciel y Catálogo Astrográfico. Para este estudio se emplearon cuatro placas CdC y una CA de la colección de Córdoba digitalizadas con la MAMA. Se encontraron errores de centrado entre 0.″08 y 0.″17, los cuales dependen de la distancia al centro de la placa. Esta precisión es adecuada para la utilización de estas placas en programas astrométricos. Finalmente, se evaluaron los parámetros morfológicos de las imágenes.

ABSTRACT

This paper examines the methodology for the identification of stellar images in Carte du Ciel and Astrographic Catalog plates. Four CdC plates and one AC plate of the Córdoba plates collection digitized through MAMA were employed for the study. Centering errors between 0.″08 and 0.″17 were found. These errors depend on the distance to the plate centre. This accuracy is suitable for the utilization of these plates in astrometric programs. Morphological parameters of images were also evaluated.

Key Words: **ASTROMETRY — CATALOGS**

In order to determine first epoch positions for the measurements of proper motions in fields greater than 2°, CdC plates are combined with AC plates. This will improve their link for a simultaneous reduction in the field under study. In this work, a zone covering an area 4° sided around Collinder 132 was selected for the development and testing of the methodology as shown in Fig. 1. Information about the cluster can be read in BDA data base (Mermilliod 1995; Dias et al. 2001 and references therein). The data were obtained through `SExtractor` (Bertin & Arnouts, 1996) from digitized images generated by MAMA (Bustos Fierro & Calderón, 2000).

AC plates have four aligned exposures of different exposure times. CdC plates have three exposures of equal exposure times arranged in an equilateral triangle. Both of them have a superimposed grid. Software for identification of stars were developed for both types of plates (Bustos Fierro and Calderón 2003; Giuppone et al. 2003). The standard deviation of the separation between pairs of exposures was employed for estimation of centering errors. The centering errors in CdC plates were found to be between entre 0.14 and 0.59 pixels (0.″08 and 0.″36) and they depend on the distance to the plate centre. In the AC plate, the centering error resulted between 0.32 and 0.45 pixels, with very slight dependence on the distance to the plate centre and noticeable dependence on the star magnitude.

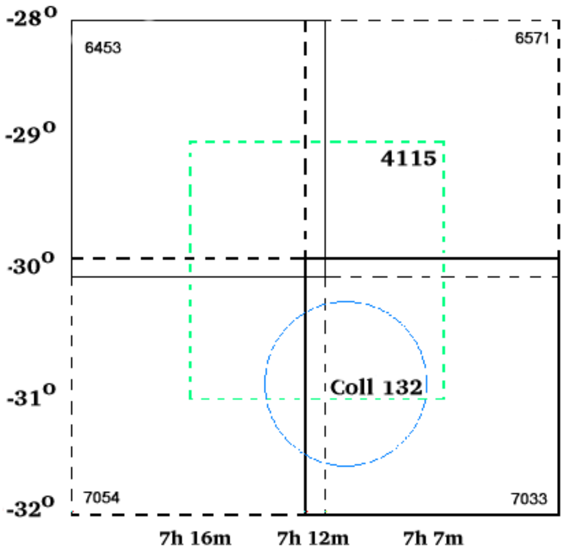

Fig. 1. Arrangement of plates in the zone of Collinder 132.

Fig. 2, shows a vector plot that represents the shape of detected images on a CdC plate, averaged on a grid of 1024 pixels of separation in order to

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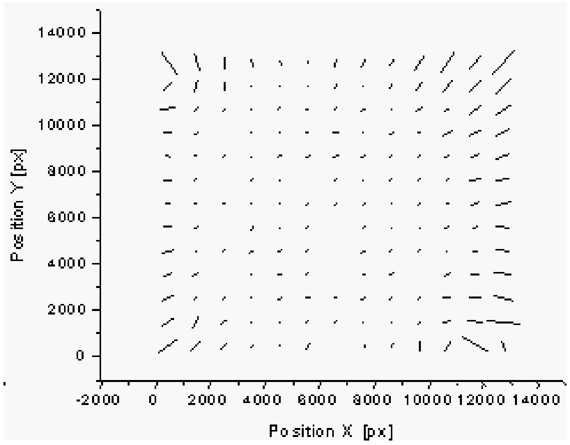

Fig. 2. Vectors plot representing the ellipticity and orientation of stellar images.

retain only the systematic pattern. The length of the vectors is proportional to the ellipticity of images and its orientation is parallel to the semimajor axis. In the AC plate as in CdC plates, images tend to be more elliptical towards the edge of the plate in an approximately radial pattern, due to optical aberrations in the astrographic telescope.

Since in AC and CdC plates every star ranges from two and four images, by averaging their centroids the error is reduced. The errors obtained are between $0\rlap{.}''08$ and $0\rlap{.}''17$ in each coordinate, which depends on the plate; that is suitable for astrometry. These errors are similar to those obtained by other authors (Dick et al. 1993; Geffert et al. 1996; Ortiz-Gil et al. 1998) with AC and CdC plates from another zones. In this way, the determination of proper motions can be done with accuracy about 2.0 to 2.5 mas/year.

REFERENCES

Bertin, E. & Arnouts, S. 1996, A&AS, 117, 393

Bustos Fierro, I. H., Calderón, J. H. 2000, BAAA, 44, 62

Bustos Fierro, I. H., Calderón, J. H. 2003, RevMexAA, 39, 303

Dias W. S., Lépine J. R. D., Alessi B. S. 2001, A&A, 376, 441

Dick, W. R., Tucholke, H. J., Brosche, P., Galas, R., Geffert, M., Guibert, J. 1993, A&A, 279, 267

Geffert, M., Bonnefond, P., Maintz, G., Guibert, J. 1996, A&ASS, 118, 277

Giuppone, C. A., Bustos Fierro, I. H., Calderón, J. H. 2003, BAAA, 46, 76

Mermilliod, J. 1995 in Information and On-Line Data in Astronomy, ed. D. Egre & M. A. Albrecht, A&AS Library, Vol 203, 127

Ortiz Gil, A., Hiesgen, M., Brosche, P. 1998, A&AS, 128, 621