

THE GREENWICH AND OXFORD ASTROGRAPHIC TELESCOPES 1958-1987

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ABSTRACT. Improvements to the Greenwich Carte du Ciel telescope since its arrival at Herstmonceux are described. The original Oxford objective may be mounted on the same telescope. Both plate collections are held at Herstmonceux.

The last plate (no.11913) was exposed on the Astrographic Telescope at Greenwich on 1956 May 15. It was then dismantled, overhauled, cleaned and re-erected at Herstmonceux in 1957 April. The new dome is electrically controlled where the Greenwich dome was moved by hand. It is 117 inches clear internal radius, which allows for a 12.25 inch dewcap and has a clear opening of 66 inches. Its geographical position is N 50 52 8.8, E 0 20 47.2, Altitude 49 metres. While the objective was off the telescope its colour curve was measured in the laboratory to be:

Colour Curve of Greenwich Objective	
Wavelength (A)	Focal Length (mm)
4300	3438
5000	3441
6000	3449
7000	3457

The optical characteristics of the objective showed no change after the move. The focal plane is still concave towards the objective and the focus is still routinely set for stars around 35 mm from the centre where the focal length is 0.5 mm shorter. It was used to mount the

Markowitz Moon Camera during the International Geophysical Year and to re-photograph the Oxford astrographic zone to determine proper motions needed to study Galactic structure. Many plates taken at this time were exposed through the glass - using plates with no anti-halation backing! This was because the proper motions were measured on a 'short-screw' machine - in fact that purchased for the 1900 Eros campaign - where the plates are clipped together emulsion to emulsion.

It was realized from the beginning that the accuracy of these proper motions would be limited by differences in the imaging of the Greenwich and Oxford objectives. To obviate this difficulty the Oxford University Observatory kindly lent their objective to the Royal Greenwich Observatory in 1962. On receipt it was discovered that while both had been produced by Sir Howard Grubb in Dublin their designs were quite different. The Greenwich objective is conventional with the crown glass component in front while the Oxford objective has the flint in front, in the form of a negative meniscus, with front radius of curvature 65 inches. The crown component is nearly plano-convex, its rear face having a radius of curvature of 750 inches. A four inch spacer is required when mounting the Oxford objective to the Greenwich tube because although the effective focal lengths are nearly the same the conjugate points are differently positioned.

Together with the objective, the Oxford University Observatory also loaned the complete plate collection taken with it. Early test plates at Herstmonceux did not reproduce the appearance of the Oxford plates and it was discovered that all the Oxford plates taken after 1900 May 7 had been taken with the optical axis displaced by 14 arcminutes East of the centre of the plate. Subsequent plates taken for proper motion are taken with the objective in the same adjustment as for the first epoch plate. It is surprising that this maladjustment did not affect the results of Stock and Corva (1983) whose 24 plates comprised seven with the objective collimated and seventeen de-collimated. The discussion of Gunther and Kox (1972) is based solely on plates taken with the telescope de-collimated.

Co-operation between Greenwich and Oxford in this project has always been close. In 1910 Greenwich commenced a series of 40 min. exposures of the Oxford Zone with the intention of filling the gap in the Astrographic Chart. Many plates were taken but the charts were never published. Again in 1938 the last 32 plates of the Oxford contribution to the Potsdam zone were taken at Greenwich.

In 1969 the telescope was provided with a new equatorial mounting built by Grubb Parsons of Newcastle upon Tyne; the tubes for camera and guider were retained apart from some trifling alterations to the camera focussing arrangement but the axes and everything down to the plinth were replaced. The new mounting has a 360 degree worm-wheel drive in place of the original 45 degree arc and the clamps are now pneumatic. The mechanical performance of the telescope was much improved by the replacement of worn bearings and drives with more modern designs. The rebuild involved no change in the optical performance.

At Greenwich the plates were kept in a wooden cupboard and not strictly protected against the then highly polluted London atmosphere. When they were brought to Herstmonceux they were placed in brown manilla envelopes with the rough side of the paper outwards and deposited in a basement with controlled environment. A project to re-envelope the plates in acid- and sulphur-free paper of archival quality is now about 25 per cent complete.

Due to a variety of unfortunate accidents not all the plates have survived to this day but we have a computer listing of those held and this is being checked as the plates are re-enveloped. The computer listing is held in the filestore of the Observatory's VAX 11/750 computer. Each plate is represented by a card image with

Plate Number	RA, Dec at date
Date	Exposure time (mins)
Evening/Morning	Filter/Grating
Greenwich/Oxford lens	Emulsion
and where taken	Direct/Through Glass
Telescope East/West	Size of Plate
Field Name or	Scientific Programme
Astrographic Field	
Centre	

It contains about 20,000 entries to 1987 January 1.

The telescope continues in sporadic use but is severely limited by lack of money and manpower. It is chiefly used for astrometry of novae or other objects in which the observatory has an interest. Now that large telescopes habitually set with an accuracy of a few arcseconds there is a continuing need to know positions more accurately.

The work described above was mostly done by other people to whom the author is deeply grateful:- Dr.A.Hunter, C.M.Lowne, P.M.Corben, E.Clements, R.W.Argyle and the late G.A.Harding.

References

- Gunther,A. and Kox,H., 1972.Astron.Astrophys.Suppl., 6,201
Stock,J. and Cova,J., 1983.Rev.Mexicana Astron. Astrof.,
5,232

Discussion:

EICHHORN I have always felt that the main advantage of remeasuring the catalogue plates is not so much the increase in precision (which would, given the right software, be remarkable) but also the extraction of information not previously extracted. Even though there are typically two or three images on a CdC plate, the information from measuring only (typically) one has been published. Besides, the information from the chart plates was never extracted since these have not yet been measured. Appropriate software should be able to overcome identification problems.

CORBIN Do you feel that the image problems on the old plates would make a modern remeasuring not worthwhile?

JONES The main problem would be the soot specks and réseau lines.

CORBIN Could you not use the existing X-Y values (old) to identify the images to be remeasured?

JONES Yes.

KISTEMAKER From how long ago are the oldest plates in your photographic archive?

JONES From 1892.

JONES Halley's constellation of Charles Oak contains the first reference to the star now known as Eta Carinae, which was much brighter then than now.

O'HORA The Greenwich Astrographic Catalogue contains data only for those stars that gave images on the two series of overlapping plates so that having the two series should help in the identification of spurious images that would require elimination.