

THE CARTE DU CIEL - THE AUSTRALIAN CONNECTION

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ABSTRACT. This paper reviews the Australian involvement in the "Carte du Ciel". Four Australian observatories - Sydney, Melbourne, Adelaide and Perth - undertook three zones of the Carte du Ciel project. This was about 18% of the total program and the Australian work took over 80 years to complete.

1. INTRODUCTION

The State observatories, located at Sydney, Melbourne, Adelaide and Perth, were founded during the latter half of the last century, with responsibility for the maintenance of a time service, meteorological observations and predictions, and of geodesic, geophysical and astronomical observations. They were also responsible for public instruction in astronomy and related subjects. With the exception of the Perth Observatory, all have now ceased scientific work or have closed.

This paper outlines the history of the Australian involvement in the CdC program. Henry Chamberlaine Russell (1836-1907) was the only Australian to attend the inaugural CdC meeting held in Paris in 1887, being one of only four people representing Southern Hemisphere observatories. On behalf of the observatories in Sydney and Melbourne Russell undertook two portions of the CdC - between declinations -34° and -40° for Sydney (later changed to -52° to -64°) and from -65° to the South Celestial Pole for Melbourne.

SYDNEY OBSERVATORY

In consultation with Mouchez of Paris, Russell initiated the CdC work. It was hoped that the Australian plates could be measured in a central bureau in Paris, but this did not eventuate and a station for measurement of both Sydney and Melbourne zones was established in Melbourne in 1898.

The astrograph was designed by Russell and the mounting was made in Sydney by the Morts Dock and Atlas Engineering Companies. The objective was manufactured by Sir Howard Grubb of Dublin and arrived in Sydney in September 1890. The instrument was located at Red Hill,

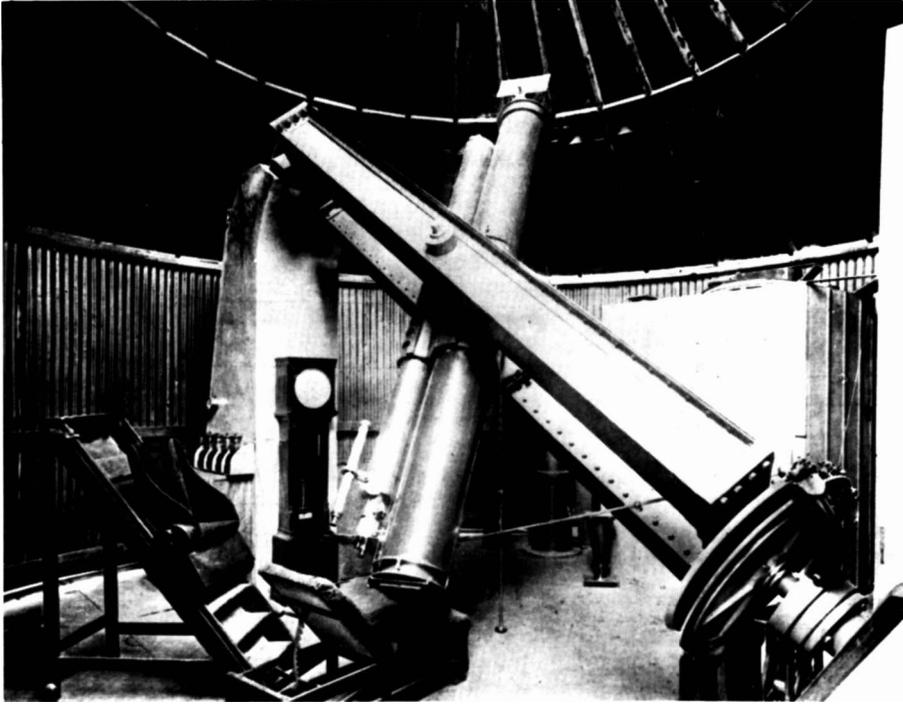


Fig. 1 - The astrographic camera from the Sydney Observatory at the Red Hill field station. Photo taken about 1890.

about 12 km north-west of the Observatory. From the outset, and for the next 20 years, the project was delayed because of prevailing economic conditions (in the 1890s 13 out of 25 banks in the State of N.S.W. were forced to suspend operations), other work of the Observatory, and changes of directorship and policy.

In 1914, under the directorship of William Ernest Cook (1863-1947), the CdC program, now some 20 years old, was assessed and revitalized. Two measuring machines were purchased in about 1915 for the Sydney plates. In 1916 a meeting of the Observatory Board expressed concern about the quality of the photographic material and subsequent plates were taken only on the best of nights. By 1921 the necessary transit work was completed. The CdC camera was returned to the Observatory from Red Hill in 1931 because of economic considerations.

Six volumes of the catalogue were published by 1925. In the same year closure of the Observatory was only averted by strong arguments, including the obligation of the Observatory to the CdC program. Most of the plate photography was completed by the end of 1928, although some plates were taken as late as 1945.

The astrographic catalogue for the Sydney section was completed

under the directorship of Harley Weston Wood (1911-1984). By 1958, 39 volumes of the CdC had been published; all 52 volumes were distributed by 1964, and the final volume, No. 53, was published in 1971.

The Melbourne Observatory zone was transferred to Sydney Observatory in 1949 after the closure of Melbourne Observatory in 1944 with only three of the planned eight volumes completed. This zone was completed by 1964. Second-epoch plates for both the Sydney and Melbourne zones were taken (using a Taylor Taylor Hobson astrograph) from Sydney but only the region $-51^{\circ} 00'$ to $-63^{\circ} 30'$ was published (King and Lomb, 1983) prior to the cessation of scientific work at the Observatory in 1982.

For over 60 years the astrographic work was a major part of the program of Sydney Observatory and in that time the Observatory had measured more star places than any observatory anywhere in the world. The zone allocated to Sydney was one of the richest in the sky, including a long arc of the Milky Way. Over 6,000 reference stars were used for the Sydney zone alone and coordinates for 740,000 star images from the Sydney zone and 200,000 from the Melbourne zone were prepared for publication by Sydney Observatory.

MELBOURNE OBSERVATORY

The zone of the CdC allocated to Melbourne Observatory was from -65° to the South Celestial Pole. The astrograph was made by Grubb and arrived in Australia in 1890, and exposures of 20 s, 2.5 min, 5 min and 1 hour were completed by 1914. Plate measurement was started in 1900 using a single-screw machine built at the Observatory. Reference stars were observed using the 8-inch transit circle (acquired 1884) and were published in five volumes. Three volumes of the CdC were published by 1930.

ADELAIDE OBSERVATORY

Some transit observations of reference stars for both Sydney and Melbourne zones were undertaken at Adelaide Observatory with the 6-inch transit circle. This work was principally under the directorship of G.F. Dodwell (1879-1963), who became Government Astronomer in June 1909. The work at Adelaide Observatory was hindered because of the small number of staff.

PERTH OBSERVATORY

In 1900 Perth Observatory accepted responsibility for the astrographic work in the zone between -31° and -41° , which had been relinquished by the Observatory of Rio de Janeiro, and this became a main activity of the Observatory for many years. The photography was completed by 1919 and the necessary transit work for the reference stars was undertaken. Plate measurements were carried out at Perth (-32° to -37°) and Edinborough (-38° to -40°) and publication began in 1911.

Six volumes of Perth results were published by 1916. The

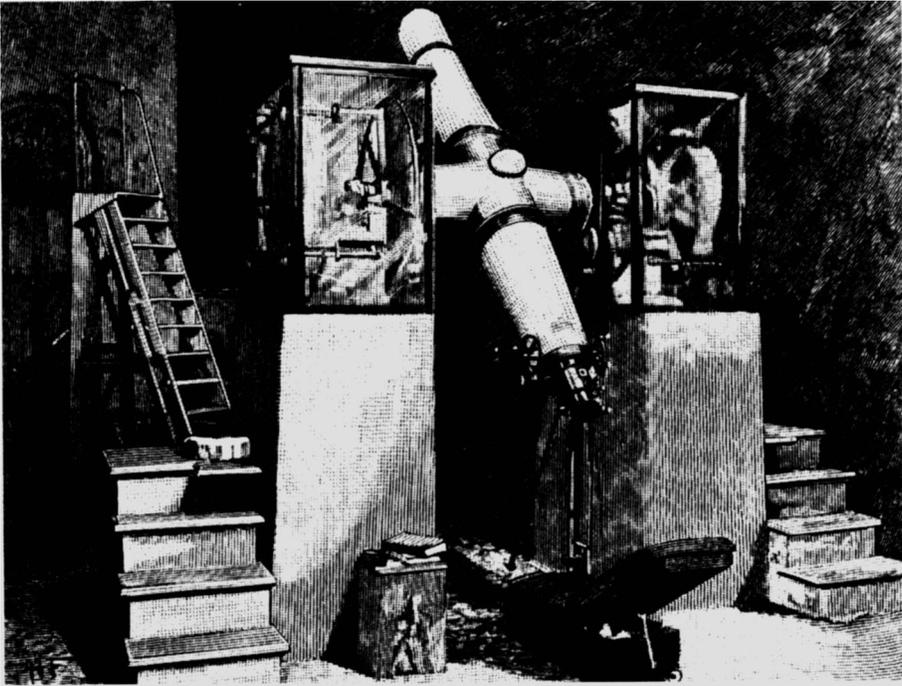


Fig. 2 - The transit telescope at the Melbourne Observatory.

Edinburgh results were not published until the period 1948 to 1952.

CONCLUSION

Four Australian State observatories undertook the observations for three major zones of the CdC. This constituted a total of 800 fields, about 18% of the total project. Work was slowed by serious economic problems in the colonies in the 1890s and early this century.

In retrospect the CdC had both good and bad effects on Australian astronomy. The project created a direction for study, and the international co-operation facilitated the emergence of Australian astronomy. Furthermore, the necessity to meet the obligations to CdC was the main driving force that kept these small observatories functioning, often under the threat of closure.

However, the point should be made that most probably other investigations in the area of astrophysics were limited by the pressure of the CdC program. The eventual development of astrophysics in Australia did not come, as might have been expected, from the established State observatories, but rather from other institutions, founded this century.

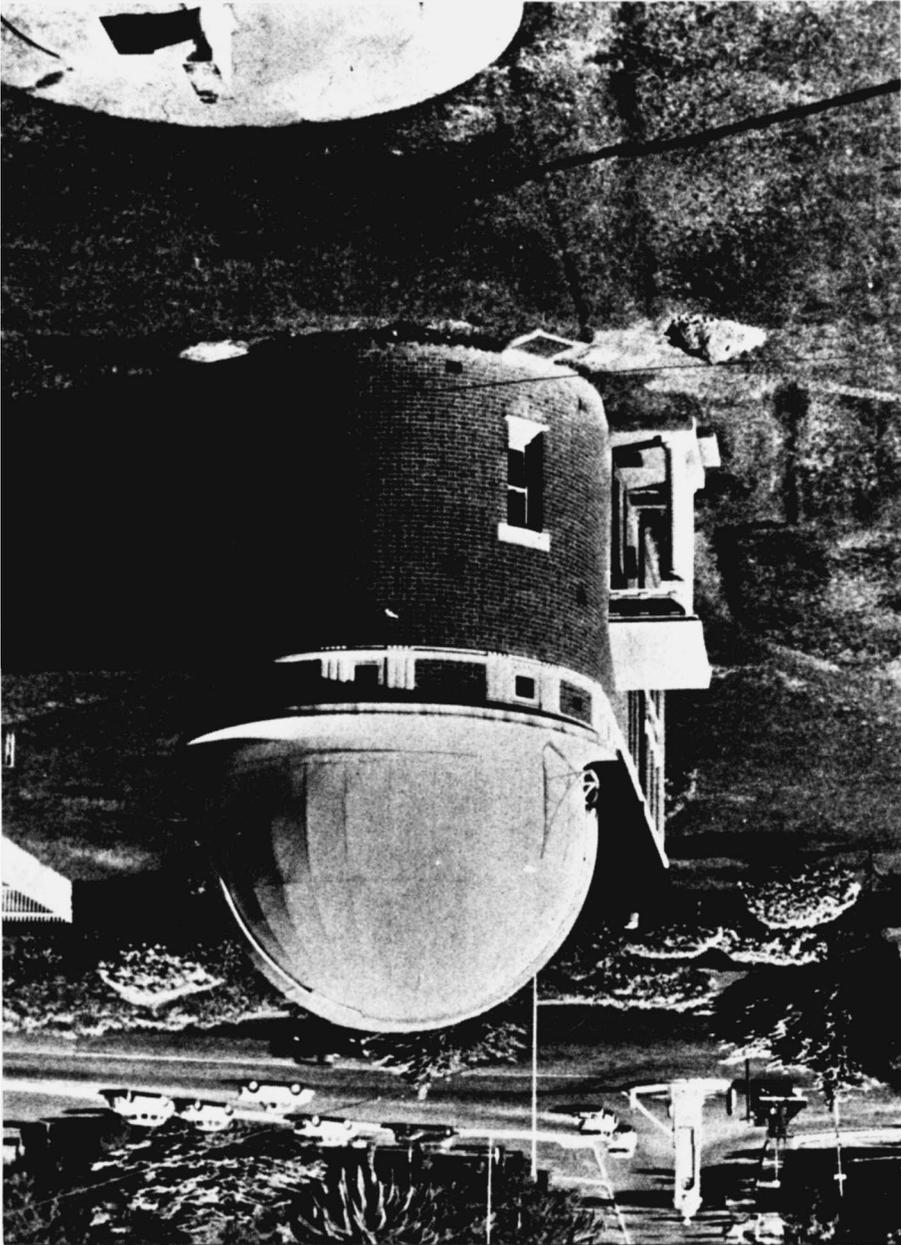


Fig. 3 - The dome of the astrographic telescope at the old Perth Observatory.

These institutions, generally speaking, have scientific objectives which are not directly related to astrometry. Of the State observatories all but Perth have now closed and much optical astrometric capacity within Australia has been lost.

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Discussion:

O'HORA All the Australian Observatories were somewhat disadvantaged by the fact that they were funded by state governments which attached priority to their work for direct local benefit such as education and meteorology. Whenever economic conditions led to cuts being made in observatory finances or resources, the Astrographic Project appears to have always suffered.