

# The Magnetic Observatory Buildings at the Royal Observatory, Cape

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## Introduction

During the 1830s there arose a strong international movement, promoted by Carl Friedrich Gauss and Alexander von Humboldt, to characterise the earth's magnetic field. By 1839 the Royal Society in London, driven by Edward Sabine, had organised a "Magnetic Crusade" - the establishment of a series of magnetic and meteorological observatories around the British Empire, including New Zealand, Australia, St Helena and the Cape. Members of the Royal Artillery were assigned to man them.

Each observatory was to have the following equipment (Anon, 1838)

1 Declination Magnetometer by Grubb of Dublin
1 Horizontal Force Magnetometer by Grubb of Dublin £73 10 (together)
1 Vertical Force Magnetometer by Robinson £21
1 Dipping Needle by Robinson £24
1 Azimuthal Transit by Simms £50
2 Reading Telescopes by Simms £6 6
2 Chronometers, £50
1 Barometer by Newman
1 Mountain ditto by Newman
1 Standard Thermometer by Newman
1 Osler's Anemometer
Wet and Dry Bulb Thermometers by Adie of Liverpool
Maximum and Minimum Thermometers by Adie of Liverpool
Daniells's Hygrometer
An Apparatus for Atmospherical Electricity

The declination and horizontal force magnetometers were similar to those designed by Gauss. Since spatio-temporal variations were part of the aim of the study, measurements were to be taken at the same time as at Göttingen.

Note: The magnetic declination (or variation) is the angle between the direction in which a compass points and the true meridian. The dip (or inclination) is the angle between the horizontal and the direction of the earth's magnetic field lines.

### **The Magnetic Observatory at the Cape**

The Royal Observatory was chosen as the site for the Cape magnetic observatory. In charge there was Thomas Maclear who had been Her Majesty's Astronomer at the Cape since 1833.

The military contingent sent to operate the Magnetic Observatory consisted of Lieut Frederick Marow Eardley-Wilmot (1812-1877), three non-commissioned officers, two gunners and drivers. They arrived on site in March 1840. Eardley-Wilmot was then 27 years old and not yet married. From his published letters (Eardley-Wilmot, F.S., 1879), it is clear that he came from an upper-crust military family. He went to school at Rugby and studied at the Royal Military Academy, Woolwich. In character, he appears to have been very religious. For example, in some of his letters home he complains about the relatively disorganized state of the Anglican Church at the Cape and expresses his worries about the increasing influence in England of the Oxford (Anglo-Catholic) movement. In another letter he reveals that he held prayers and a Bible reading daily with his men. He seems to have regarded his actual work at the Magnetic Observatory as a chore to be borne stoically. At one point during his stay he was obviously happy to have escaped magnetic observing to take part in military operations along the Eastern Frontier. He was to leave the Cape around 1846 and the running of the Observatory then devolved onto Maclear, as the latter had from the start feared that it might. On his return to England Eardley-Wilmot became director of the Military Academy at Woolwich and eventually attained the rank of Major-General. He became a Fellow of the Royal Society in 1863.

Some of the equipment had suffered breakages in transit but with Maclear's aid he was able to get it repaired. His magnetic Observatory was established in the SE part of the Royal Observatory's grounds and was finished in February 1841. A few more months elapsed in preparing the equipment for use.

A map of the Royal Observatory grounds dating from 1850 still exists and shows clearly the buildings of the Magnetic Observatory. This was made accurately, to scale, and can be overlaid on later maps to show precisely where the buildings were or still are relative to others that still exist (see Fig 1).

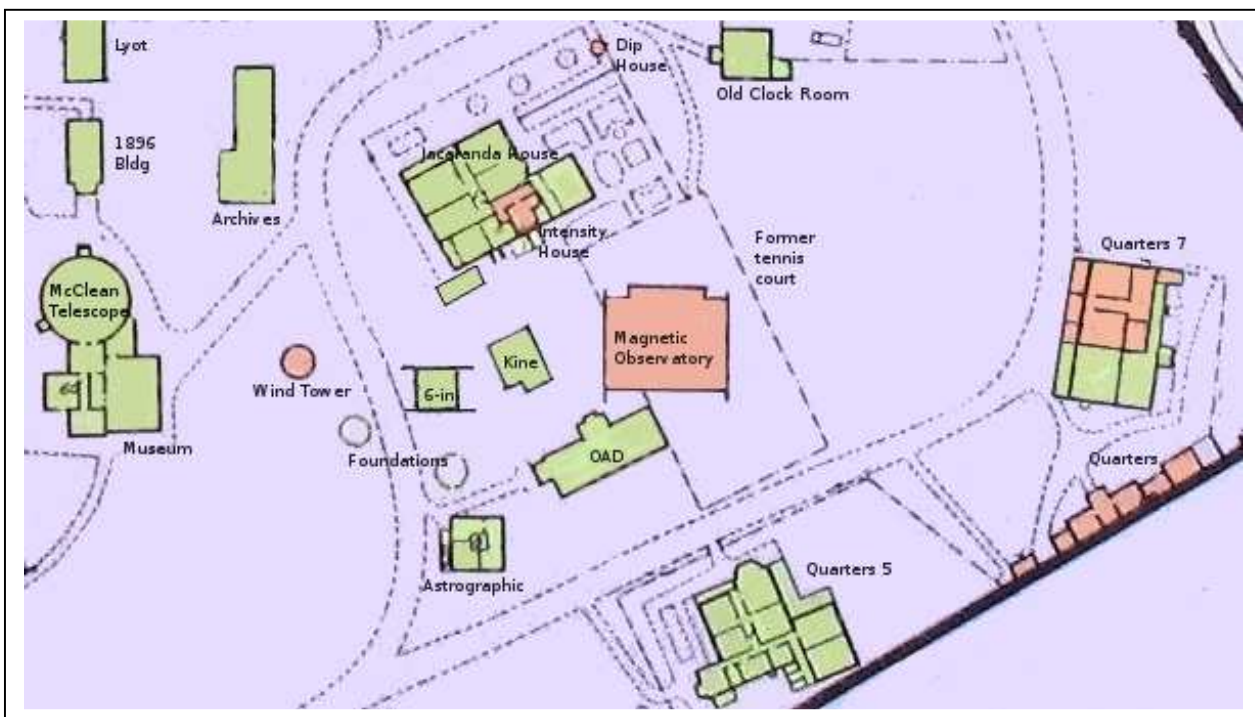


Fig 1. The positions of the buildings of the Magnetic Observatory (red), overlaid on a more recent map. The Observatory itself, the Wind Tower, the Dip House and the row of small buildings labelled "Quarters" have completely disappeared. North is up.

Among the earliest photographs taken at the Cape (by CP Smyth, the First Assistant at the Observatory) are a few of the Magnetic Observatory around the start of 1843. Two of these have been reproduced by Warner

(1978 and 1983). Several nineteenth-century drawings of the Observatory show the magnetic buildings (see, for example, Figs 2 and 3).

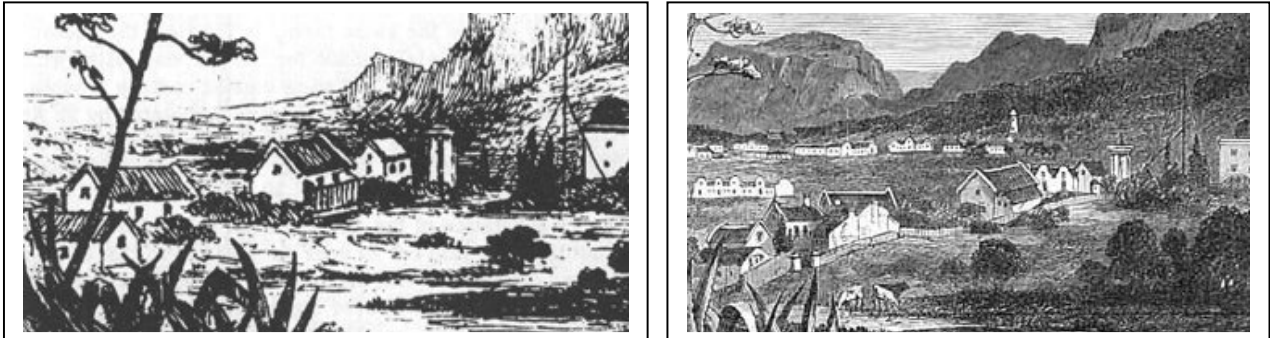


Fig 2 (left) Part of a view, looking SW, by CF Angas, that must have been drawn around 1847 when he visited the Cape. Fig. 3 (right) is from the *Illustrated London News*, 17 June, 1865. Clearly seen in both are the Wind Tower, Intensity House and Magnetic Observatory. In the 1865 view, the Dip House (very small) also appears (between the Intensity House and the Wind Tower). A Corner of the main Royal Observatory building appears on the right in each image.

### **The Main (Magnetic) Observatory Building**

The interior of the main Observatory building was 48 x 28 feet (14.6 x 8.5m) and built of 12-inch (30cm) logs (Sabine, 1851). Inside was a lath and plaster lining separated from the outer walls by 1 foot (30cm). The roof was of felt. Non-magnetic construction materials such as copper and zinc were used instead of iron nails. In general, freedom from drafts and extreme temperature changes were essential for the functioning of the somewhat delicate instruments inside.

The main laboratory ran the whole length of the south side of the building and was 17' wide by 12 high (5.1 x 3.7m). Isolated solid sandstone pillars supported the instruments and the floor was of Purbeck paving stone.

This building was destroyed by fire on 12 March 1852. The papers it contained were lost but the instruments were saved. Vast numbers of copper nails and other metal bits were collected from the ruin.

According to Warner (1978), a new, smaller Observatory with dimensions 18 x 18 feet (9.2 x 9.2m) was budgeted for in 1859, using some of the materials, including the paving stones, from the ruined one. It is not clear where this building was. Fig 3, which dates from 1865, shows a possible candidate, though it looks the same as the building in the 1847 one (Fig 2). The similarity of these two pictures suggests that the artist of the second one was strongly influenced by the first one and may have been lazy about updating the details. Another picture was published on 21 March 1857 in the Illustrated London News (see Glass, 2015) but does not show this building (which may however have been just outside the edge of the scene).

### **The Cottage**

A two-room cottage had been constructed for Eardley-Wilmot to occupy but he ceded it to Captain Clerk, an additional assistant, who had a family to take care of. He himself then lived in the Wind Tower (see below). “I need hardly say that this, though apparently a small evil, is, when continued for four years, a very disagreeable sort of habitation” (Eardley-Wilmot, F.S., 1879).

The Cottage still exists as Quarters 7 but has been considerably extended, probably during the 19<sup>th</sup> Century, and possibly before 1865, if the detail in the picture from that date (Fig 3) can be believed.

### **The Wind Tower**

The Wind Tower (Fig 4), a circular building having an internal (?) diameter of 9 feet (2.74m), originally supported an Osler Anemometer, invented in 1835 by A.F. Osler (1808-1903). This consisted of a large wind vane and a “pressure plate” that was deflected according to the wind strength. Both

the strength and the direction of the wind were recorded automatically by pencils on a clock-driven paper chart. An automatically recording rain gauge was included. Osler instruments were also in use at the Royal Greenwich and other observatories.



*Figure 4. The Wind Tower, photographed around 1889, when it was in use for the sky survey known as the Cape Photographic Durchmusterung. The CPD telescope with its Dallmeyer lens can be seen within the open dome.*

The flat lead roof of the Wind Tower was removed in 1882 when a building was needed to house a new 6-inch (15cm) telescope, bought with the Transit of Venus in mind. A dome of 15 feet (4.6m) diameter was purchased from Grubb of Dublin by the then HM Astronomer, David Gill. This dome was somewhat unusual in that it was partly cylindrical in shape. Its steel frame was covered by canvas over a wire and felt underlayer. It ran on a cast iron rail and gutter, finished with lion-head spouts. Inside was a tapered concrete pillar was built to support the telescope. The modifications were completed around June 1882 (see Gill, 1881).

In September 1882, the new telescope was put to good use. William Finlay used it to make the first observations of the Great Comet of that year and with it he also discovered Comet 1886e (Finlay). Later the same month it supported and acted as a guider for the Ross camera with which Gill took the photographs of the 1882 Comet that eventually led to photographic charting of the stars (Glass, 1985).

The 6-inch mount was used to bear the square wooden camera fitted with the Dallmeyer lens for the definitive exposures of the Cape Photographic

Durchmusterung from  $-19^{\circ}$  to  $-58^{\circ}$ . This was in the period April 1888 to November 1889. The remainder of the sky, from  $-58^{\circ}$  to the pole, had been observed earlier, in a dome on the site of the present 18-inch/Heliometer building. The camera had then been mounted on another stand owned by Gill, which nowadays carries the 9-inch Grubb at the former Republic Observatory in Johannesburg.

The 6-inch telescope was back in the Wind Tower in 1898-99 at the time of Willem de Sitter's visit. To it was attached a Zollner photometer. In 1935 it was moved to its present building with a roll-off roof. A Cooke 6-inch telescope was subsequently mounted in the Wind Tower and was used by amateurs until 1954, when it fell into disuse.

The Wind Tower building was demolished in 1966, having decayed to the point where it was not worth repairing. In 1970 its dome was used to cover the Ron Atkins Telescope of the Cape Centre of ASSA (Anon 1970), though it seems to have been altered considerably for this purpose. When the Cape Centre building was demolished ca 1985 the dome was acquired by Mr Rainer Noack, a Cape Town amateur.

### **The Intensity House**

In the 1847 figure (Fig 2) the building next to the Wind Tower was the Intensity House. However, the 1865 (Fig 3) picture shows that it had in the meantime been extended, with two extra gable ends. The three-gable structure probably forms the core of the present "Jacaranda House". In a recent survey of the house, the Cape Town heritage architect John Rennie found that the part coincident with the site of the Intensity House (see Fig 1) has thicker walls than the rest, which more-or-less confirms the identification.

## Dip House

The Dip House was a comparatively small structure that stood where the fence around Jacaranda House was later placed. It survived into the 20<sup>th</sup> Century.

## Mens' Quarters



*Fig 6. This shows some of the small buildings labelled "Quarters" on the map (Fig 1).*

This group of buildings along the boundary fence (see Fig 6) included two dwelling rooms and a pantry. Also in this row were probably the wash house, toilets, stables and a shed. They were demolished at some point during the 20<sup>th</sup> Century.

None of the magnetic instruments supplied to the Cape observatory still exist. However, a barometer by Newman can be seen in the room of the SAAO where the Airy transit circle once stood and may have been that of the Magnetic Observatory.

## The end of the Magnetic Observatory

According to Warner (1979), interest in the magnetic observatory gradually waned and after Maclear's retirement in 1869 no further work was carried out. The only remaining parts of the original buildings have been greatly modified.



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