= Toronto Magnetic and Meteorological Observatory =

The Toronto Magnetic and Meteorological Observatory is a historical observatory located on the grounds of the University of Toronto , in Toronto , Ontario , Canada . The original building was constructed in 1840 as part of a worldwide research project run by Edward Sabine to determine the cause of fluctuations in magnetic declination . Measurements from the Toronto site demonstrated that sunspots were responsible for this effect on Earth 's magnetic field . When this project concluded in 1853 , the observatory was greatly expanded by the Canadian government and served as the country 's primary meteorological station and official timekeeper for over fifty years . The observatory is considered the birthplace of Canadian astronomy .

= = Sabine 's study = =

Compasses tended to " wander " from north when measurements were taken at different locations or even at a single location over a period of time . The astronomer Edmund Halley noted this and the problems it would cause for navigation in 1701 . It was also believed that whatever was causing this effect might be causing changes in the weather , and that studying magnetic variations might lead to better weather prediction .

In 1833 the British Association for the Advancement of Science commissioned a series of magnetic measurements across the United Kingdom . Under the direction of Major Edward Sabine of the Royal Artillery , a multi @-@ year measuring project began , with the results to be published in 1838 . As the measurements were being made a number of proposals were put forth to expand the program worldwide . In 1836 the German explorer and naturalist Alexander von Humboldt wrote to Prince Augustus Frederick , Duke of Sussex , then President of the Royal Society , stating that a formal program was important to a nation with dominions spread across the globe . At the seventh meeting of the British Association in Liverpool in 1837 , Sabine declared that " the magnetism of the earth cannot be counted less than one of the most important branches of the physical history of the planet we inhabit " and mapping its variations would be " regarded by our contemporaries and by posterity as a fitting enterprise of a maritime people ; and a worthy achievement of a nation which has ever sought to rank foremost in every arduous undertaking " .

In 1837 , the British Government funded the installation of a magnetic observatory at Greenwich . The Association continued to press for the construction of similar observatories around the world , and in 1838 their suggestions were accepted by the Government and funds were provided . In 1839 the British Government and the Royal Society prepared four expeditions to build magnetic observation stations in Cape Town ; St. Helena ; Hobart , Tasmania and (eventually) Toronto . Teams of Royal Artillery officers were sent out to take the measurements . The team assigned to Canada originally planned to build their observatory on Saint Helen 's Island off Montreal , but the local rocks proved to have a high magnetic influence , and the decision was made to move to Toronto instead . The team arrived in 1839 , and set up camp at Fort York in a disused barracks while construction started on new buildings . The observatory was given 10 acres (4 @.@ 0 ha) of land to the west of King 's College ; the Ontario Legislature now occupies the area on which the college was located .

The observatory , officially " Her Majesty 's Magnetical and Meteorological Observatory at Toronto " , was completed the following year . It consisted of two log buildings , one for the magnetic instruments and the other a smaller semi @-@ buried building nearby for " experimental determinations " . The north end of the main building was connected to a small conical dome which contained a theodolite used to make astronomical measurements for the accurate determination of the local time . The buildings were constructed with as little metal as possible ; when metal was required , non @-@ magnetic materials such as brass or copper were used . A small barracks was built nearby to house the crew .

Using the measurements from the Toronto and Hobart sites , Sabine noticed both short @-@ term fluctuations in magnetic declination over a period of hours , and longer @-@ term variations over months . He quickly concluded that the short term variations were due to the day / night cycle , while

the longer term ones were due to the number of visible sunspots . He published two introductory papers on the topic in the Philosophical Transactions of the Royal Society . The first , in 1851 , was a collection of early measurements ; the second in 1852 correlated with Heinrich Schwabe 's sunspot measurements , which had been made widely available in Alexander von Humboldt 's Cosmos , also published in 1851 . With further data collected from the Toronto site , Sabine was able to demonstrate conclusively that the eleven @-@ year sunspot cycle caused a similarly periodic variation in the Earth 's magnetic field . He presented a third and conclusive paper on the topic in 1856 , " On Periodical Laws Discoverable in the Mean Effects of the Larger Magnetic Disturbances " , in which he singled out the Toronto site for particular praise .

Sir John Henry Lefroy , a pioneer in the study of terrestrial magnetism served as director of the magnetic observatory from 1842 to 1853 ; In 1960 , the Ontario Heritage Foundation , Ministry of Citizenship and Culture erected a Provincial Military Plaque in his honour on the University of Toronto campus .

= = Meteorological service = =

In 1853 the Royal Society 's project was concluded , and the observatory was set to be abandoned . After a lengthy debate , the fledgling colonial government decided to take over its operation . Rather than disappearing like its three counterparts , the Toronto observatory was upgraded , and its mission was expanded as it became a meteorological station (see Meteorological Service of Canada) under the direction of the Ministry of Marine and Fisheries . During the expansion , the original buildings were replaced with a permanent structure .

The new building was designed in 1853 by local architect Frederick Cumberland , who was also working on the design of University College , which was being built just north of the Observatory to replace King 's College . The new observatory design called for a stone building , with an attached tower containing the theodolite . The new building was completed in 1855 , and stood directly opposite the entrance of today 's Convocation Hall .

During its time as a meteorological station , the observatory collected reports from 312 observation stations in Canada and another 36 in the United States . Each station was equipped with a " Mercurial Barometer , two Thermometers (a maximum and a minimum Thermometer) , an Anemometer to measure the velocity of the wind , a Wind Vane and a Rain Gauge " . Reports were sent in coded form to the Observatory at 8 am and 8 pm every day , Eastern Standard Time (then known as " 75th meridian time ") , and used to produce a chart predicting the weather for the following 36 hours . These predictions were then telegraphed across the country , and charts were distributed to newspapers and the Board of Trade , where they could be viewed by the public . With the installation of telephones , the Observatory also offered weather reports on demand , which was an important service to fruit vendors , who used the reports to plan shipping .

Among its other uses , in 1880 , measurements from the site were used as part of the effort to develop standard time . The observatory remained the official timekeeper for Canada until 1905 , when that responsibility was transferred to Ottawa 's Dominion Observatory . At exactly 11 : 55 am the clocks in Toronto fire halls were rung by an electrical signal from the Observatory .

In 1881 the observatory 's director , Charles Carpmeal , suggested adding a high @-@ quality telescope to the observatory . He felt that direct solar observations would lead to a better understanding of sunspot effects on weather (as late as 1910 the observatory 's then @-@ director , R. F. Stupart , noted that " sun spots have more to do with our weather conditions than have the rings around the moon . ") . Coincidentally , the Canadian government (having formed in 1867) was interested in taking part in the major international effort to accurately record the December 1882 Transit of Venus .

Funds were provided for the purchase of a 6 @-@ inch (150 mm) refracting telescope from T. Cooke & Sons . The dome was originally designed to mount a small transit , and the lengthy telescope , over 2 metres long , had a limited field of view though the dome 's opening . A large stone pillar was constructed inside the tower , raising the telescope to bring it closer to the dome and improve its field of view . Unfortunately , the new telescope was unable to take part in the transit

measurements due to bad weather , and missed the 1895 Transit of Mercury for the same reason .

= = Relocation = =

By the 1890s , the observatory had become crowded by the rapidly growing university . Electrification of the tramways along College Street just to the south , and the large quantities of metal used in the modern buildings surrounding the site threw off the instruments . A new magnetic observatory opened in 1898 in Agincourt , at that time largely empty fields , [1] leaving the downtown campus location with its meteorological and solar observation duties .

By 1907 , new university buildings completely surrounded the observatory ; dust from the construction clogged meteorological instruments , and at night electric lighting made astronomical work impossible . The Meteorological Office decided to abandon the site and move to a new building at the north end of campus on Bloor Street , trading the original Observatory to the University in exchange for the new parcel of land . There was some discussion regarding what to do with the Cooke telescope , since the Meteorological Office had little use for this purely astronomical instrument . No other use was immediately forthcoming , and the telescope moved along with the Meteorological Office to their new Bloor Street Observatory .

The university assumed ownership of the now @-@ disused observatory building and was originally going to abandon it . Louis Beaufort Stewart , a lecturer in the Faculty of Applied Science and Engineering , campaigned for it to be saved for the Department of Surveying and Geodesy . He eventually arranged for the building to be re @-@ constructed on a more suitable site . Demolition work was carried out in 1907 : the stones were simply left in place over the winter , and were used the following year to construct a re @-@ arranged building just east of the main University College building (south of Hart House) .

In 1930 the Meteorological Office no longer used the Cooke telescope , and agreed to donate it to the university if they would handle its removal . Both the telescope and the observatory dome were moved to the observatory building . The telescope moved once again in 1952 to the David Dunlap Observatory north of the city , and in 1984 it was donated to the Canada Science and Technology Museum . The Department of Surveying and Geodesy used the observatory until the 1950s . Since then the office areas have been used for a variety of purposes , including a police substation and a telephone switchboard . Renamed as the Louis Beaufort Stewart Observatory , the building was handed over to the Students ' Administrative Council (now University of Toronto Students ' Union) in 1953 , which has used the building since then . The dome , now unused , receives a yearly multi @-@ colour paint job by engineering students .