

**Tracking the north magnetic pole**

*Dr. Paul Serson, director of the division of geomagnetism, Department of Energy, Mines and Resources, has been tracking the north magnetic pole for 35 years. Excerpts from an article prepared by him for GEOS, Winter 1980 follow:*

Magnetic charts of Canada have a distinctive feature found on no other national charts — the north magnetic pole. It is the point on the earth's surface, some 1,400 km distant from the north geographical pole, to which a magnetic compass would lead a traveller starting from any other point.

There would be no rest for the traveller upon reaching the pole, however, since it is in continuous motion. Every 24 hours it describes an elliptical path about its mean position, and from year to year its mean position gradually drifts in response to the secular variation of the earth's magnetism.

The Department of Energy, Mines and Resources Earth Physics Branch has the responsibility of tracking these hour-by-hour and year-by-year changes, and of providing up-to-date magnetic charts of Canada....

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The search for the north magnetic pole began in earnest in 1818 with the British Royal Navy's campaign to discover the Northwest Passage. John Ross explored the west side of Baffin Bay. His second in command was Edward Parry, and he had two formidable magnetic observers: his nephew James Clark Ross and Edward Sabine. They measured inclination and made the first measurements of intensity in North America....

From his magnetic observations on the east coast of Boothia...James Ross became convinced that the north magnetic pole lay not more than 100 miles to the west. Travelling with Eskimos and stopping for observations on the way he reached his goal on June 1, 1831. A magnetic needle suspended horizontally by a single fibre of silk showed no directional preference. The dip circle gave a measurement of 89°59 minutes.

(The north and south poles are defined as the two places where the dip stands perpendicular to the surface of the sphere, that is a place where the inclination or dip is 90°.)

...Ross built a cairn to mark the spot at Cape Adelaide. Ten years later the

same James Ross was to become the first man to reach the south magnetic pole.

Ross could detect that the north magnetic pole was moving as he tried to locate it, and he would have liked to investigate its daily and annual motion, but the limitations of his instruments, and of the provisions he could carry, made such a study impossible.

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With the establishment of the Dominion Observatory in 1905, the Federal Government assumed responsibility for the magnetic survey of Canada. During the next 40 years magnetic observers such as C.A. French and R.G. Madill followed the tracks of the early explorers, down the northern rivers by canoe and to the far north by Arctic patrol ships. A comparison of their observations with those of the nineteenth century indicated a general northward drift of the pattern of magnetic curves. By the end of World War II, the configuration of the magnetic field in the Canadian Arctic had become a matter of interest to the military as well as for civil air transport.

In...1945, the Dominion Observatory organized its first survey to be transported entirely by air, with the aid of the Royal

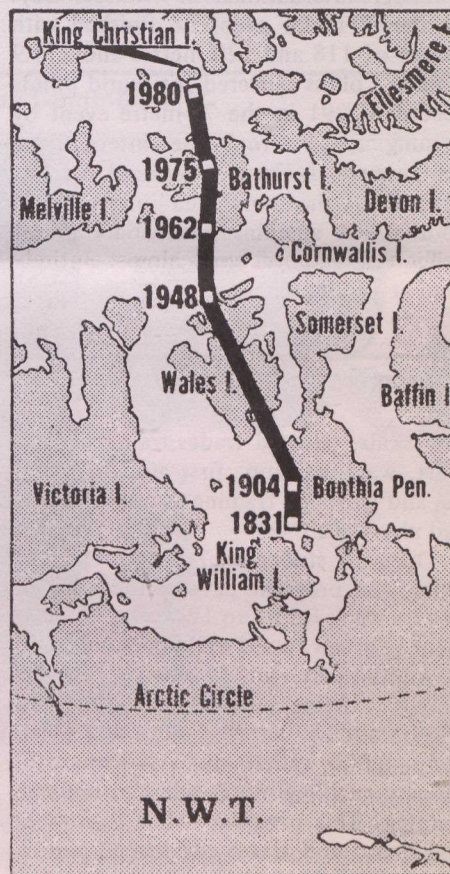
The north magnetic pole has been moving northwest across the Canadian Arctic at 25 kilometres (15 miles) a year and since 1904 has advanced about 800 kilometres (500 miles) northwest. It is now north of the Saskatchewan border just south of King Christian Island in the Franklin District of the Northwest Territories. Because steel ships deflect the needles of scientific compasses, called magnetometers, readings of the pole are often made from aircraft, which are usually non-magnetic, or from the magnetic observatory in Resolute Bay.

Canadian Air Force (RCAF). The expedition was headed by Dr. Morris Innes, who measured the force of gravity at each stop, an operation that took nearly a week in those days. As a student summer assistant [Dr. Serson], was sent on this trip as magnetic observer, obtaining data at ten points in the Western Arctic, the most northerly being Coppermine and Cambridge Bay.

In 1946 [he] was sent as magnetic observer on a three-month circuit of the eastern Arctic on the Hudson's Bay supply ship *Nascopie*. The next few summers, travelling by RCAF Canso aircraft, [the group] surrounded the north magnetic pole with observations taken with a new electronic magnetometer developed especially for use near the pole. The highlight of these surveys was in 1947, when J.F. Clark and [Dr. Serson] observed for 20 hours at Allen Lake on Prince of Wales Island. [Their] average dip was 89°36 minutes, but twice...measured 89°56 minutes, indicating that the pole had come within a few miles of where [they] were standing. In 1948 a magnetic observatory was established at Resolute Bay, and the north magnetic pole has been under constant observation ever since.

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...James Clark Ross was very fortunate to have measured a dip of 89°59 minutes on June 1, 1831, especially since a measurement with his equipment took an hour, and even on a quiet day the dip can change by 30 minutes in an hour. James Ross realized this, and he published all his readings to allow others to judge whether he had reached the pole or not. Whatever doubts Ross had himself, his readings indicate that he spent a day closer to the north magnetic pole than any observer since.



Globe and Mail, Bernard Bennell

*The route of magnetic north since 1831.*