

In exploration for minerals a great variety of techniques have been used, depending on the various physical properties by which ores differ from their surroundings. At present interest is perhaps greatest in the airborne magnetometer, certain airborne radiation detectors, and in electromagnetic methods. The recording from the air of small changes in the earth's magnetic field has led to such important recent discoveries as the magnetic iron ore at Marmora, Ont., and the base metal ores, associated with magnetic minerals, near Bathurst, N.B. Similarly, large areas are being investigated for radioactive deposits by means of airborne counters. Because many ore minerals are good electrical conductors they may be located by electromagnetic techniques, in which electric currents are induced in subsurface conductors by primary alternating magnetic fields on the surface. Recent improvements in the method, including the use of a wide range of frequencies for the primary field, have led to such discoveries as the extensions of the Gaspé copper deposits.

Gravitational methods also play a role in exploration for minerals and have the advantage that of all geophysical methods the indications are most closely related to the all important mass or tonnage of the bodies producing them.

ASTRONOMY IN CANADA*

The modern era of astronomy in Canada may be said to have begun in 1905 with the completion of the Dominion Observatory, the national observatory of Canada. Prior to then an astronomical observatory established in 1851 at Fredericton, N.B. was used for a short time to determine the longitude of that centre and for general astronomical purposes; it has recently been rehabilitated as a historic monument. Other small observatories were established, one at Quebec city in 1854 and one at Kingston in 1875. Astronomical instruments were to be associated with the Magnetic Observatory built by the British Government at Toronto in 1839 but there is no record of them being set up until 1881. A small observatory set up at McGill University in 1879 was used for many years for time observations.

Today the science of astrophysics is carried on mainly by three Canadian institutions: the Dominion Observatory at Ottawa, Ont., the Dominion Astrophysical Observatory at Victoria, B.C., both of which are administered by the Department of Mines and Technical Surveys, and the David Dunlap Observatory associated with the University of Toronto. Of the two Government institutions, the Dominion Observatory at Ottawa specializes mainly in the astronomy of position, in solar physics and in various branches of geophysical work, while the major effort in astrophysics is concentrated at the Dominion Astrophysical Observatory at Victoria. The David Dunlap Observatory, founded in 1935, is equipped with very fine astrophysical instruments of a kind similar to those in use at Victoria. It performs not only the functions of a privately financed and administered research institution but is also the nucleus of the Department of Astronomy at Toronto University. In addition to the work of these three major institutions and a number of smaller observatories, investigations in the field of radio astronomy are conducted by the National Research Council.

THE DOMINION OBSERVATORY

The Dominion Observatory had its origin in the survey activities of the Government and the immediate occasion for its construction in 1905 was the great increase in astronomical work required by the survey of railway lands donated by the Province of British Columbia to ensure the construction of the Canadian Pacific Railway. In its early years the Dominion Observatory was intimately associated with geodetic surveying but since 1916 work of that type has been done by another branch of government. The present work of the Dominion Observatory is summarized in the following paragraphs.

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