



EXPLANATION

147

Magnetic contours with flight traverse; dashed contours indicate incomplete or doubtful data. Contour intervals 50 and 250 gammas

Magnetic contour enclosing area of lower magnetic intensity

X 2700
 Measured maximum or minimum intensity within closed high or closed low

○ Drill hole

Index map of Minnesota showing area covered by this map

This aeromagnetic contour map and accompanying profiles are a part of a series showing the results of aeromagnetic surveys over approximately 45,000 square miles in Minnesota. The survey was conducted by the U. S. Geological Survey in cooperation with the Minnesota Geological Survey. The purpose of the investigation was to delineate the major magnetic trends associated with known iron ore deposits and to indicate areas that may be favorable for additional exploration.

Total-intensity aeromagnetic data were obtained by flying north-south lines spaced a mile apart at altitudes close to 500 feet above the ground. Magnetic detecting equipment consisted of the continuous recording AN/ASQ-8A airborne magnetometer modified for geophysical use with the detecting element towed about 75 feet below the aircraft. A continuous record of the altitude above ground was obtained by a recording radio altimeter. Flight lines plotted on aerial photos were used for flight guidance. The actual flight path was recorded by a gyro-stabilized continuous-strip camera establishing ground location control. A system of simultaneous identification points marked the camera, altimeter, and magnetometer records. East-west base lines were drawn to correct for diurnal variation and drift and to adjust the flight lines to a common arbitrary datum.

The magnetic anomalies shown on this map result from differences in the magnetic properties of the buried Precambrian rocks and not of the overlying rocks described in this text. The available data on both the depth of drift and the nature of rocks underlying the glacial drift—although meager—are as complete as possible.

The area mapped lies along the eastern margin of the bed of former glacial Lake Agassiz but the southeast quarter is largely above the highest beach. Lake-washed clay till and beaches cover much of the area and clayey till covers the remainder. The lake sediments and glacial deposits range from about 125 feet to 300 feet in thickness. Bluish shale and white sand of Cretaceous age are widespread beneath the drift and occupy a depression in the Precambrian rock surface. Cretaceous sedimentary rocks extend as far east as R. 42 W and may extend farther as outliers. The Cretaceous strata are as much as 50 feet thick.

Precambrian rocks have been penetrated in several wells and are covered with residual clay. Most of the wells that enter the Precambrian are in granite, but meager data suggest the possibility of other rocks. The pattern of the magnetic contours agrees with the indication from wells that much of the map area is underlain by granite. The strong magnetic anomaly across the south-central part, however, is probably not granite. It may be a band of schist with magnetic beds.

Note

Aeromagnetic data are obtained and compiled along a continuous line, whereas ground magnetic surveys are made at separate points. Errors within the normal limits of any magnetic measurement may cause slight discrepancies between flight lines in an aeromagnetic map, which would be more obvious than similar discrepancies between points in a ground magnetic map. For this reason as much care should be exercised in evaluating magnetic features that appear as elongations along a single aeromagnetic traverse as in interpreting an anomaly indicated by a single ground station.

Base map from Minnesota Department of Highway maps
 Planimetry does not meet national standard map accuracy

AEROMAGNETIC MAP OF WESTERN RED LAKE AND CENTRAL POLK COUNTIES, MINNESOTA

By
 K. G. Books, G. M. Schwartz, J. L. Meuschke, and W. J. Dempsey
 TOTAL INTENSITY CONTOURS RELATIVE TO ARBITRARY DATUM

