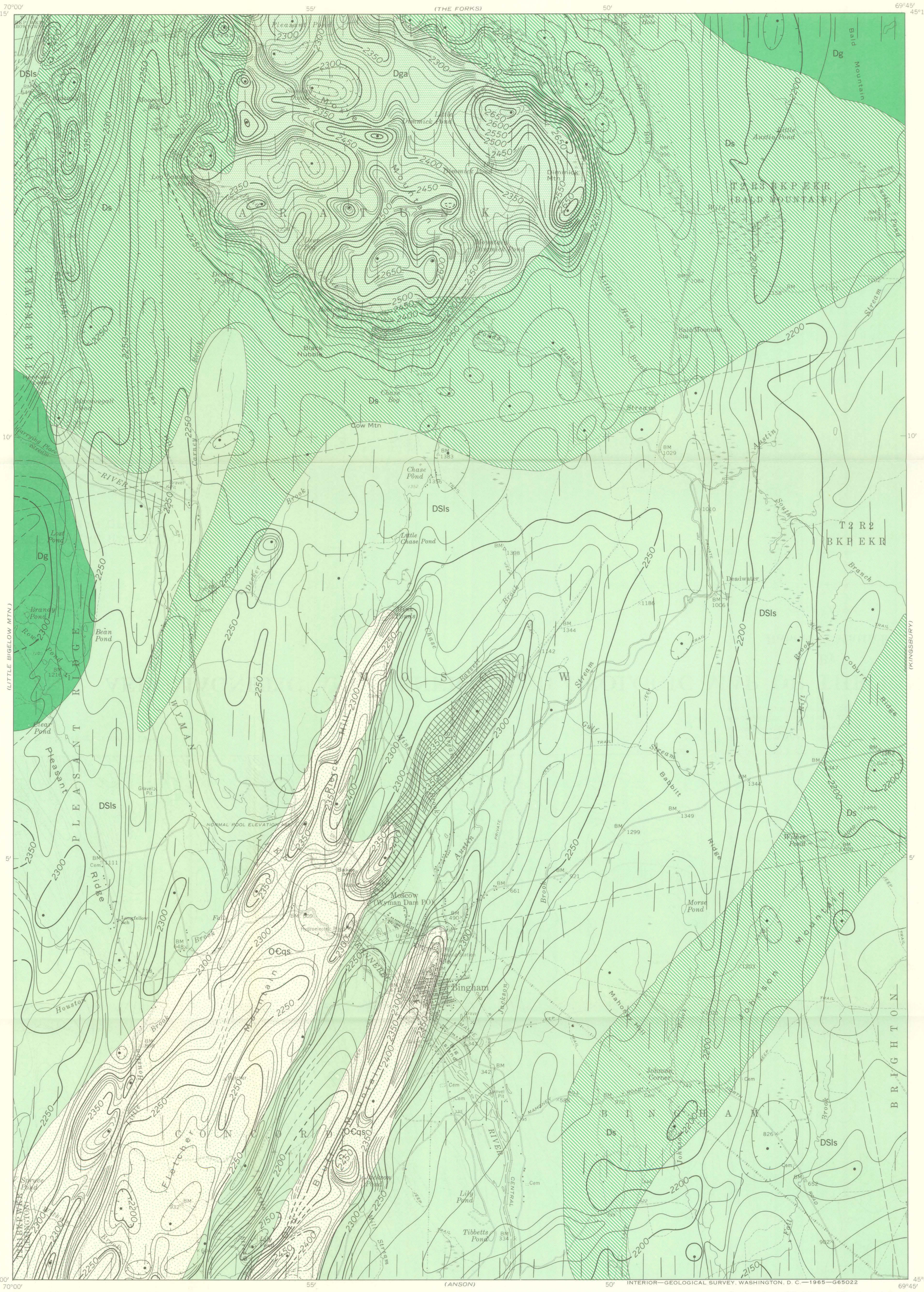
DEPARTMENT OF THE INTERIOR
UNITED STATES GEOLOGICAL SURVEY

GEOPHYSICAL INVESTIGATIONS
MAP GP-499



Base by U.S. Geological Survey, 1956

Geology from GP-312 modified in vicinity of Moxie Mountain from mapping by G. S. Visher.
Aeromagnetic survey flown at 750 feet above ground by R. W. Bromery, 1958

INTERIOR—GEOLOGICAL SURVEY, WASHINGTON, D. C.—1965—G65022

EXPLANATION

DEVONIAN

Middle(?) Devonian

Dg — Granitic rocks

Dga — Gabbroic rocks

Lower Devonian

Ds — Dark gray slate with thin beds of fine grained sandstone, often cyclicly layered
Possibly equivalent in parts to Seboomook Formation

SILURIAN OR DEVONIAN

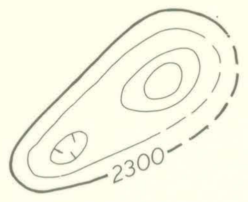
DSls — Sandy limestone and calcareous fine grained sandstone with thin slate layers

CAMBRIAN OR ORDOVICIAN(?)

O€qs — Massive quartzite and black sulfide-bearing slate

Area of possible O€qs outcrops as interpreted from aeromagnetic data

Contact
Dashed where approximately located



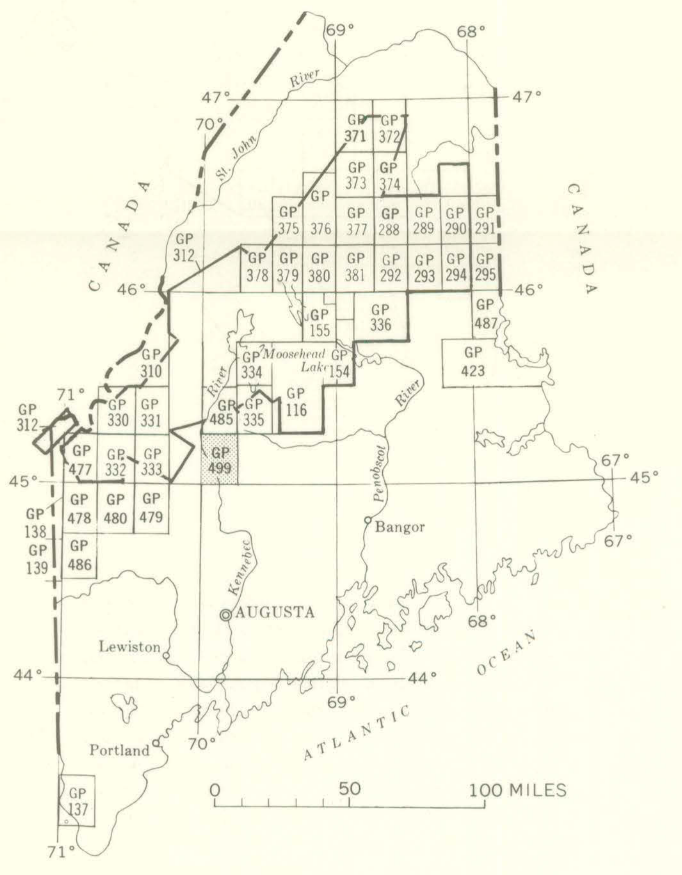
Magnetic contours showing total intensity magnetic field of the earth in gammas relative to arbitrary datum
Hachured to indicate closed areas of lower magnetic intensity; dashed where data are incomplete

Location of measured maximum or minimum intensity within closed high or closed low

Flight path
Showing location and spacing of data

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



INDEX MAP OF MAINE SHOWING AEROMAGNETIC MAPS PUBLISHED BY THE U.S. GEOLOGICAL SURVEY. AREA OF GP-499 SHADED

GEOLOGIC INTERPRETATION OF MAGNETIC ANOMALIES

INTRODUCTION

In 1958 the U.S. Geological Survey conducted an aeromagnetic investigation, under the direction of R. W. Bromery, in central Maine. The object of this report is to correlate the resulting aeromagnetic data for the Bingham quadrangle with the geology.

A brief summary of the surveying technique is as follows. A series of 47 north-south lines, each approximately 34 miles in length and spaced at about quarter mile intervals, was flown while the change in total intensity of the earth's magnetic field was continuously recorded on a modified AN/ASQ-3A magnetometer. While recording, the aircraft maintained an altitude of approximately 750 feet above ground. Several east-west lines were also recorded in a similar manner to compensate for diurnal magnetic variation and instrument drift.

The geology is from a geologic map of northern Maine by Boucot and others (1964) and modified from mapping by Glenn S. Visher. [1]

[1] Visher, G. S., 1960, The Geology of the Moxie pluton, west-central Maine Northwestern University, Ph.D. Thesis.

MAGNETIC ANOMALIES

Four pronounced magnetic features are in the Bingham quadrangle. The most striking of these is the roughly circular high approximately 5 miles in diameter in the north-central part of the mapped area having a maximum amplitude of 450 gammas. This magnetic high outlines an area of gabbro centered on Moxie Mountain; in general there is good agreement between the aeromagnetic anomaly and the geologic boundaries. If it is assumed that the maximum magnetic gradient should coincide with the edge of the body, as is true of most magnetic features of this type, then it is possible that the gabbro pluton at the surface extends farther east and south than shown, or that gabbro lies at a very shallow depth in these two areas.

A group of magnetic anomalies characterized by three parallel linear highs extends northeastward from the southwest corner of the map. These magnetic features are associated with two elongate areas of quartzite and slate of Cambrian or Ordovician(?) age, the smaller area has a magnetic high centered directly over it, as would be expected if the rocks here were more magnetic than the surrounding material; however, the larger area has a magnetic low centered over it and a series of highs paralleling each flank.

According to Charles Osgood (written communication to Andrew Griscom, 1959), the rocks consist of a thin upper unit of black slate overlying a lower massive quartzite and are folded in a double anticline. The slate apparently is more magnetic than the underlying quartzite and is the source of the magnetic anomaly. This explains the difference in appearance of the magnetic features associated with the two areas. The relatively thin layer of magnetic slate has been removed by erosion from the center of the larger anticline exposing the lower quartzite, and a series of magnetic highs parallels each flank where the slate remains.

The southeastern elongate magnetic high associated with the larger anticline extends two to three miles farther northeast than the rocks shown on the map. This may indicate that the magnetic slate crops out farther northeast than mapped, into the lined area shown on the geologic map. It also suggests that the larger anticline bifurcates into two smaller northeast-plunging anticlines along which only the magnetic slate is exposed.

In the northwest corner of the magnetic map is a small north trending anomaly having a maximum amplitude of about 200 gammas. The adjoining aeromagnetic map of the Forks quadrangle (Bromery, 1961) shows the anomaly continuing in a northeasterly direction and increasing in amplitude. Although the anomaly roughly parallels the outcrop of a narrow dikelike body of gabbro in the Forks quadrangle, it does not coincide with the gabbro, and possibly is produced by an unrecognized magnetic bed in the unit of dark-gray slate of Early Devonian age.

A relatively small linear magnetic high of about 25 gammas amplitude trends eastward from the south-central edge of the map and continues beyond the east edge of the quadrangle. Although the anomaly appears to be interrupted, this is probably caused by the long narrow north trending magnetic low that cuts across it almost perpendicularly. The origin of this small magnetic high is perhaps a thin dike which is exposed. Using the method of depth interpretation presented by Vacquier and others (1951, p. 9-41), the origin of this magnetic high was computed to be at or very near the surface of the ground.

The long narrow north trending magnetic low that extends throughout the entire length of the quadrangle near the east edge of the map is similar to a north trending low near the west edge of the map. Both of these lows are of small amplitude and show consistent linearity that parallels the flight lines. It is possible that these lows are geologically controlled, but it is more probable that they are due to inconsistencies inherent in the fitting together of the flight lines.

REFERENCES CITED

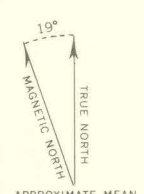
Boucot, A. J., Griscom, Andrew, and Allingham, J. W., 1964, Geologic and aeromagnetic map of northern Maine: U.S. Geol. Survey Geophys. Inv. Map GP-312, has been published.

Bromery, R. W., Natof, N. W., 1964, Aeromagnetic map of the Forks quadrangle, Piscataquis and Somerset Counties, Maine: U.S. Geol. Survey Geophys. Inv. Map GP-485.

Vacquier, Victor, Steenland, N. C., Henderson, R. G., and Zietz, Isidore, 1951, Interpretation of aeromagnetic maps: Geol. Soc. America Mem. 47, 151 p.

AEROMAGNETIC AND GENERALIZED GEOLOGIC MAP OF THE BINGHAM QUADRANGLE, SOMERSET COUNTY, MAINE

By
Robert E. Mattick



SCALE 1:62 500

1 ½ 0 1 2 3 4 5 MILES

1 .5 0 1 2 3 4 5 KILOMETERS

CONTOUR INTERVAL 10 AND 50 GAMMAS

1965

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For sale by U.S. Geological Survey, price 50 cents