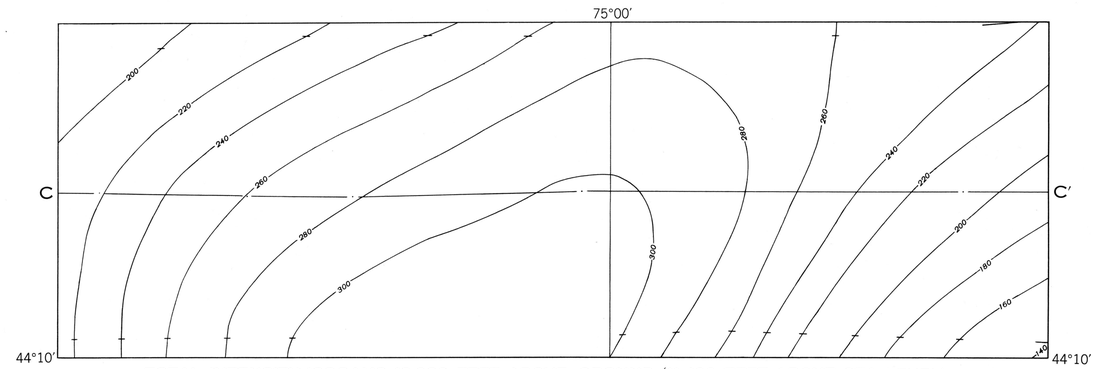
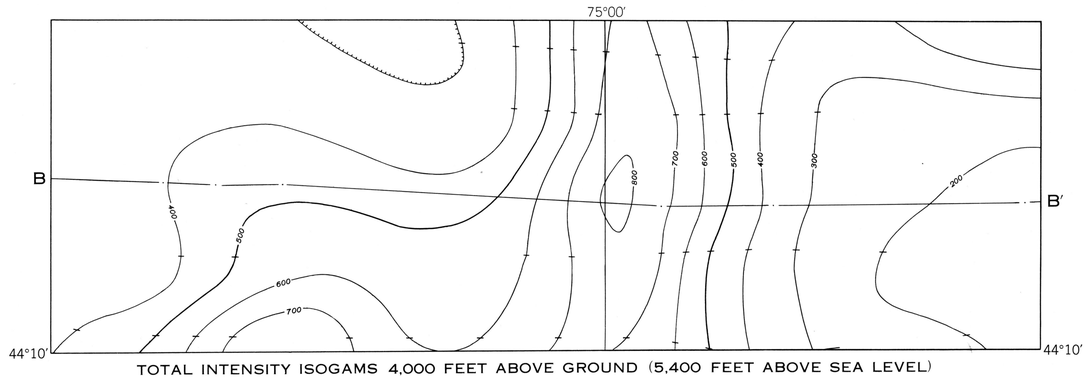


TOTAL INTENSITY ISOGAMS 10,000 FEET ABOVE GROUND (11,400 FEET ABOVE SEA LEVEL)



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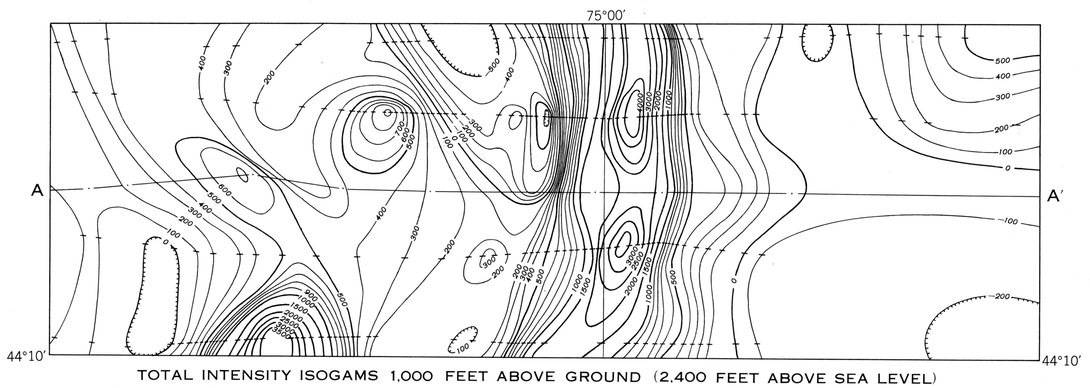
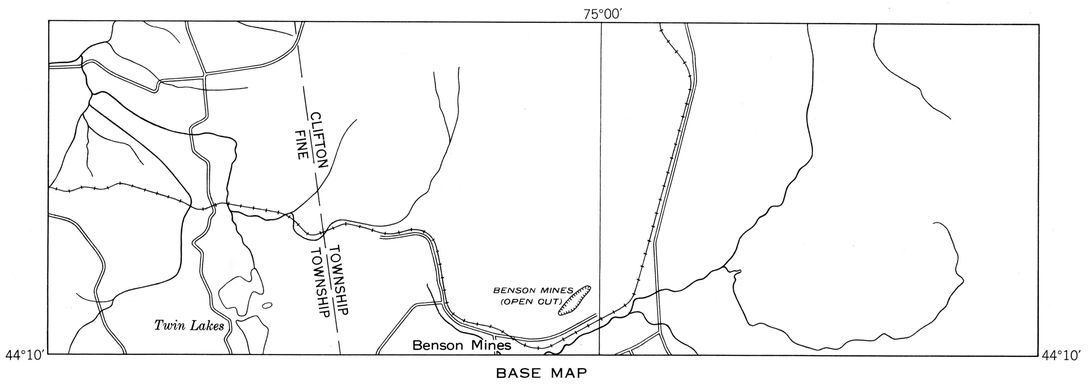
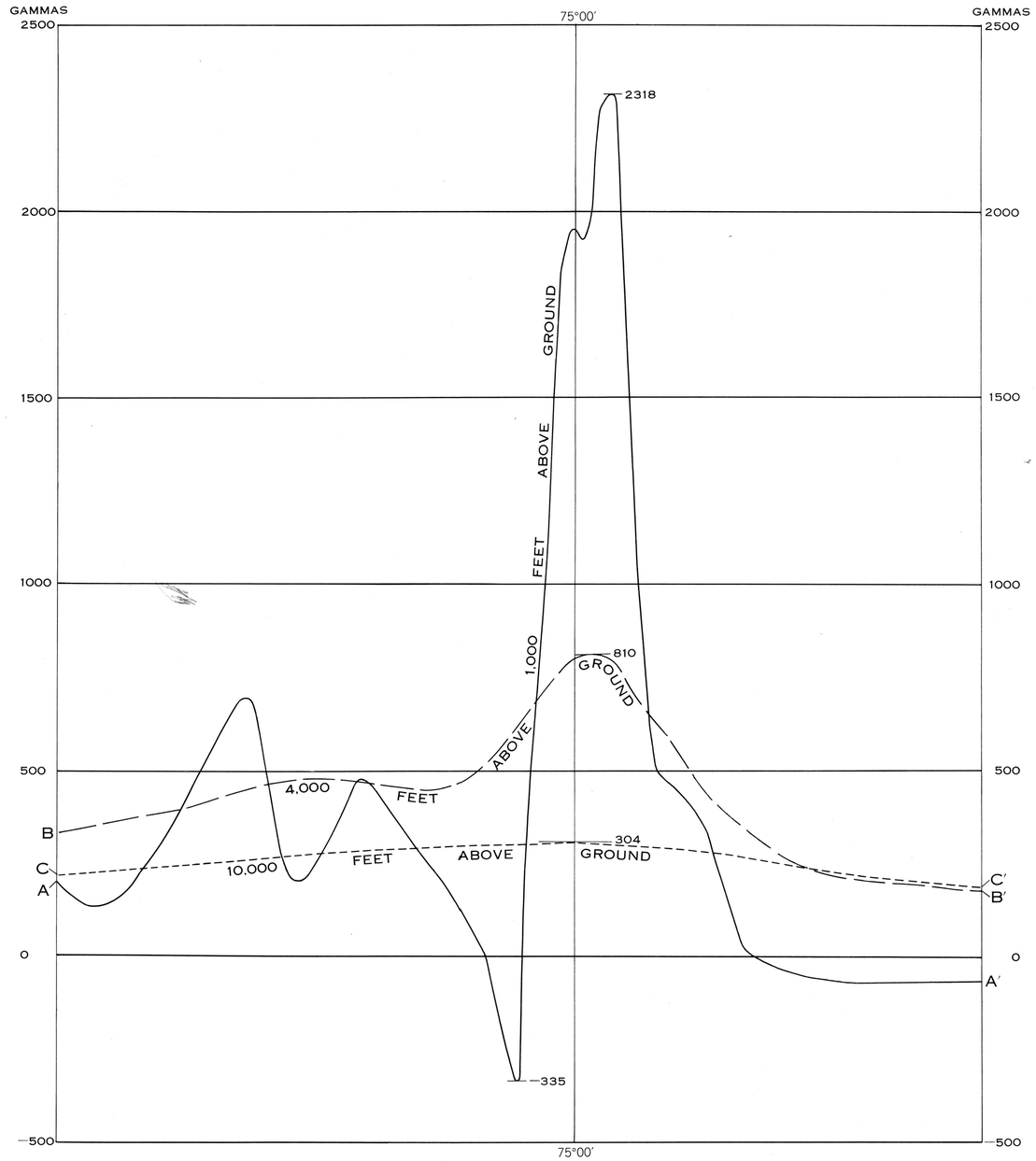


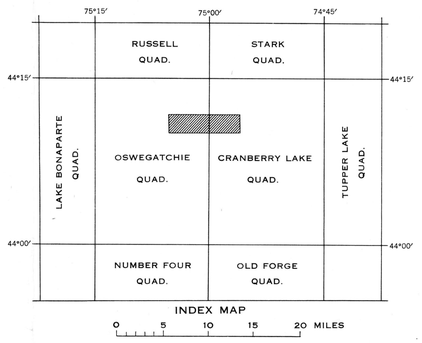
TOTAL INTENSITY ISOGAMS 1,000 FEET ABOVE GROUND (2,400 FEET ABOVE SEA LEVEL)



BASE MAP



TOTAL MAGNETIC INTENSITY PROFILE CURVES OVER BENSON MINES



INDEX MAP

EXPLANATORY TEXT

An aeromagnetic survey was run at three levels over the Benson Mines magnetite deposit, St. Lawrence County, N. Y., for the purpose of determining experimentally the attenuating effect of altitude on magnetic bodies cropping out at the surface. Benson Mines was chosen as a test problem because of the low topographic relief, the high intensity and large areal extent of the anomaly at the surface, and the sharp contrast between the highly magnetic core and the nonmagnetic country rock. Unfortunately, the Benson Mines anomaly was not sufficiently isolated with respect to adjoining anomalies to give clear-cut results, as the Twin Lakes anomaly 2 miles west of the main Benson Mines pit apparently blends with the Benson Mines anomaly at the 10,000-foot flight level.

Five traverses were run at an altitude of 2,400 feet (1,000 feet above ground surface), five at 5,400 feet, (4,000 feet above ground), and three at 11,400 feet (10,000 feet above ground). The location of flight lines where they intersect isogams is shown on the adjoining magnetic maps by short cross lines. For each level the magnetic datum was determined by short north-south magnetic base lines. Some difficulty was encountered in establishing a common magnetic datum relating the three levels, and a small discrepancy, probably not more than 100 gammas, may exist in the datum determinations for the three levels.

The western two-thirds of the 1,000-foot survey duplicates a part of the area covered on the survey of the Oswegatchie quadrangle (Geophysical Investigations, Preliminary Map No. 1), which was flown on a different day and with profile traverses spaced at quarter-mile intervals as compared with half-mile intervals for the Benson Mines survey. The two sets of data were compiled and isogams drawn entirely independently. Comparative results of these duplicating surveys give a rough measure, not only of the accuracy with which data can be reproduced by resurvey, but of the added detail brought by closer spacing of the traverse lines.

Three profiles, representing variations in total magnetic intensity along a traverse line in the center of the area (indicated on the isogam maps by a solid traverse-line symbol) have been plotted. As can be readily seen, the magnetic gradient and intensity decreased progressively with height above ground.

No attempt has been made to analyse the data mathematically to determine how closely the observed effect of increasing elevation conforms with physical theory. Theoretical studies of this kind, however, are believed to be of paramount importance in affording a background for interpretation of aeromagnetic data. Results of the Benson Mines survey are presented at this time for the purpose of providing the geophysical profession with raw material for qualitative and quantitative studies of the behavior of magnetic fields in space.

The area was flown during the morning of June 28, 1945. The flight crew consisted of E. M. Canfield, pilot of the Aero Service Corporation, and J. R. Balsley, D. L. Rossman, and C. L. Rogers of the Geological Survey. The data were compiled and the maps drawn by H. E. Hawkes, M. E. Hill, and J. L. Meuschke.

AUG 30 1946
GEOLOGY

AEROMAGNETIC SURVEY AT THREE LEVELS OVER BENSON MINES

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