DEPARTMENT OF THE INTERIOR
UNITED STATES GEOLOGICAL SURVEY

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Aeromagnetic surveys and data reduction

The map of the residual total magnetic intensity was compiled from a synthesis of data acquired from six aeromagnetic surveys. These surveys, encompassing a total area of about 82,000 km^2, were flown at elevations ranging from 500 ft (0.15 km) to 1700 ft (0.52 km) above mean terrain clearance and with flight-line spacings of 0.5 mi (0.85 km) or 1.0 mi (1.61 km). Flight-line directions were east-west except for a small area (Jespersen, 1964). All surveys were corrected for diurnal variations of the Earth's magnetic field and for changes in flight elevation. The residual aeromagnetic field was obtained by removing the international geomagnetic reference field (IGRF 1965 or 1975) (Zmuda, 1971) after updating to the years in which the surveys were flown.

To merge the various surveys, an elevation of 1000 ft (0.305 km) above terrain was selected as the reduction datum level. Surveys flown in a drape mode (constant elevation above terrain) above or below this datum level were analytically continued upward or downward so that the data are compatible. For surveys flown at a constant barometric altitude, the mean terrain clearance within the survey area was determined and used to analytically continue the associated data to the selected reduction datum level. The surveys were merged, utilizing one-dimensional splining techniques described by Bhattacharyya and others (1979). The data were gridded at a spacing of 2 km, and a Lambert conformal projection was employed using 87° W. longitude as the central meridian.

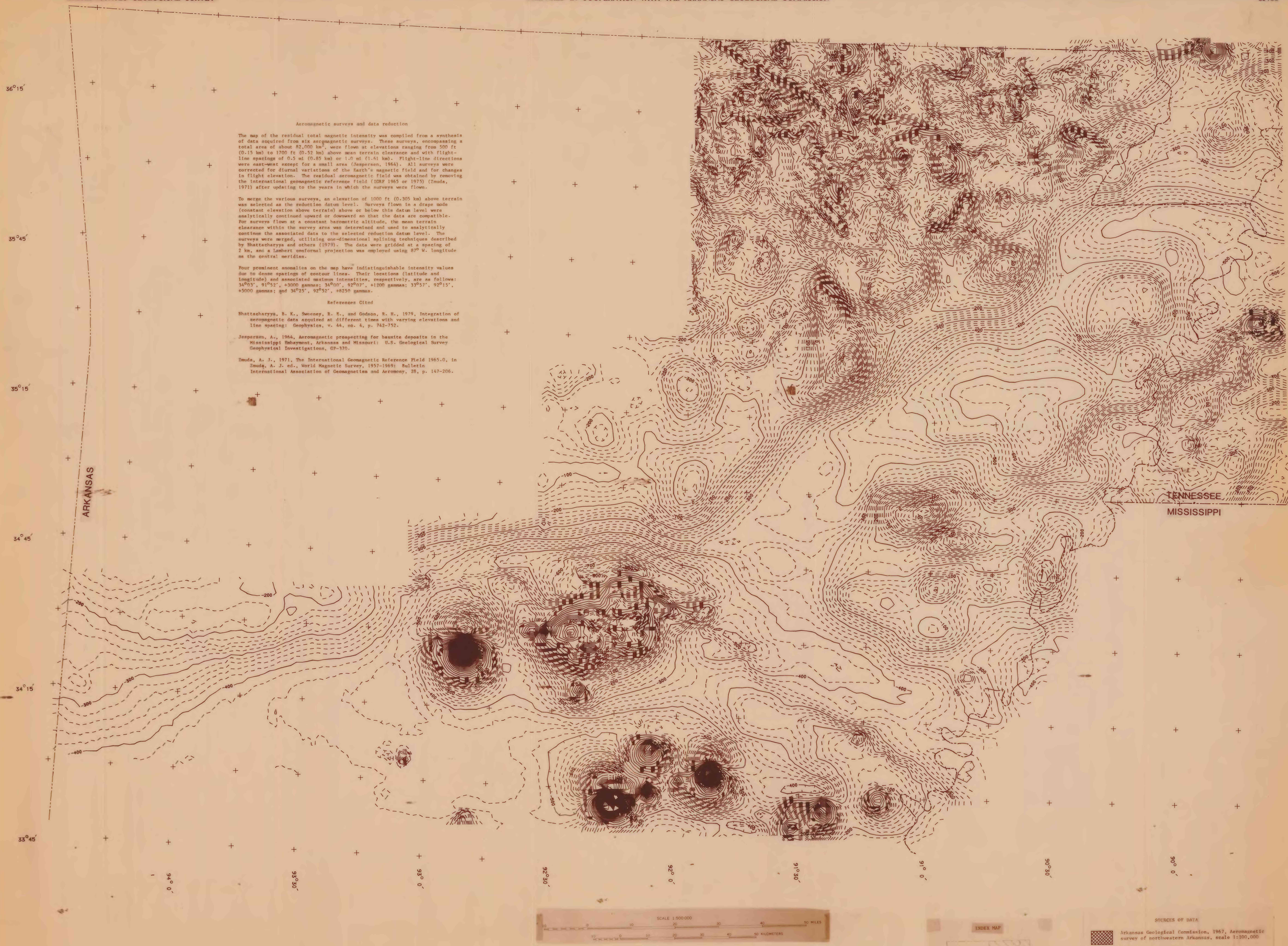
Four prominent anomalies on the map have indistinguishable intensity values due to dense spacings of contour lines. Their locations (latitude and longitude) and associated maximum intensities, respectively, are as follows: 34°03′, 91°52′, +3000 gammas; 34°00′, 92°07′, +1200 gammas; 33°57′, 92°15′, +5000 gammas; and 34°25′, 92°52′, +8250 gammas.

References Cited

Bhattacharyya, B. K., Sweeney, R. E., and Godson, R. H., 1979, Integration of aeromagnetic data acquired at different times with varying elevations and line spacing: Geophysics, v. 44, no. 4, p. 742-752.

Jespersen, A., 1964, Aeromagnetic prospecting for bauxite deposits in the Mississippi Embayment, Arkansas and Missouri: U.S. Geological Survey Geophysical Investigations, GP-370.

Zmuda, A. J., 1971, The International Geomagnetic Reference Field 1965.0, in Zmuda, A. J. ed., World Magnetic Survey, 1957-1969: Bulletin International Association of Geomagnetism and Aeronomy, 28, p. 147-206.



EXPLANATION

MAGNETIC CONTOURS--Showing residual magnetic field intensity. Contour interval is 20 gammas. Hachures indicate closed areas of low intensity.

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This map is preliminary and has not been edited or reviewed for conformity with Geological Survey standards or nomenclature.

AEROMAGNETIC MAP OF CENTRAL AND NORTHEASTERN ARKANSAS

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SOURCES OF DATA

Arkansas Geological Commission, 1967, Aeromagnetic survey of northwestern Arkansas, scale 1:100,000

Unpublished aeromagnetic survey of east-central Arkansas; survey conducted by Harold Yarger of the Kansas Geological Survey for the Arkansas Geological Commission, in cooperation with the U.S. Nuclear Regulatory Commission and the U.S. Geological Survey.

Four surveys described in Hendricks, J.D., and Hildenbrand, T.G., 1979, Total field aeromagnetic map of northeast Arkansas: U.S. Geological Survey open-file report 79-1208, scale 1:250,000.