Kansas Geological Survey
Lawrence, Kansas

MAP M-41A
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Aeromagnetic Map of Kansas

Reduced to the Pole with Second Vertical Derivative Calculated

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This map is based on the aeromagnetic data of the Kansas Geological Survey (Yarger, 1983, "Regional interpretation of Kansas aeromagnetic data," Kansas Geological Survey, Geophysical Series 1; Yarger et al., 1981, "Aeromagnetic map of Kansas," Kansas Geological Survey, Map M−16). The data were measured at three different elevations, 762 m above sea level in eastern Kansas (east of longitude 98.30°), and 914 m and 1,372 m above sea level in the east half and west half of western Kansas, respectively. US−283 (longitude 99.90°), which runs north−south through western Kansas, was used as a visual landmark to the pilot to change elevation. Flight lines spaced 3.2 km apart were flown east or west along section lines. The data density along a flight line is 8−11 points/km. The International Geomagnetic Reference Field 1975 was used in data processing. The data were used to generate 1.6 km by 1.6 km grids by universal kriging. The final grid is 205 rows by 408 columns. The inclination and declination of the geomagnetic field are, respectively, chosen as 65° and 7°, which are the average values in Kansas (Yarger, 1983). The aeromagnetic data are first reduced onto a horizontal plane of 914 m above sea level (Xia et al., 1993, "Correction of topographic distortions in potential−field data: a fast and accurate approach," Geophysics, v. 58, p. 515−523). Then the data are reduced to the pole, and the second vertical derivative is calculated at the same time (Yarger, 1983). The effects of remanent magnetization are ignored during the calculation of reducing to the pole. All calculations are performed in the frequency domain and edge effects are present, such as anomalies parallel to the southern border from longitudes 98.60° to 98.20°. In order to shade the map, a smoothing operator, with a weighting function of 1/distance (SURFACE III) over 5 row by 5 column grids, is applied to the second vertical derivative data.

Scale 1:1,000,000

1 inch equals approximately 16 miles

0 mi 25
0 km 40

Shading interval is 3 nT/km/km.

Lambert Conformal Conic Projection
with standard parallels of 33° and 45°

The data were gridded and shaded using SURFACE III developed by Robert Sampson at the Kansas Geological Survey, with the assistance of Dana Adkins−Heljeson.

Reduction to the pole removes the effect of the inclination of the Earth's magnetic field and improves the resolution and location of anomalies (particularly along the north−south direction). Anomalies after reduction to the pole are equivalent to the magnetic field that would be observed if the Earth's inducing field were vertical. The second vertical derivative of aeromagnetic data attenuates low−frequency signals, enhances high−frequency signals usually caused by near−basement−surface sources, separates anomalies horizontally, and delineates near−vertical magnetic contacts or fault planes by zero values on the second vertical derivative map. High−low pairs of relatively high values on this map normally indicate contacts with relatively high susceptibility contrast. The location of the positive amplitude indicates which side of contact has high susceptibility.