UNITED STATES DEPARTMENT OF THE INTERIOR

GEOLOGICAL SURVEY

AEROMAGNETIC GRIDDED DATA FOR NEW JERSEY

by

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Open-File Report 92-700 A-D

1992

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INTRODUCTION

This document is intended to accompany 3 IBM-PC compatible, 5.25" high density floppy diskettes containing digital aeromagnetic data grids for the state of New Jersey. The three grids were created from digital and analog aeromagnetic data acquired by the U.S. Geological Survey (USGS) as part of the Cooperative Geologic Mapping (COGEOMAP) Program. These grids were used to create a black and white contour map of the state of New Jersey, which will be published in three sheets (figure 1) at a scale of 1:100,000. The scale and dimensions of the aeromagnetic maps will match the forthcoming new geologic map of New Jersey.

The release of these grids will permit manipulation and display of the data on a PC screen when used with the recently released U.S. Geological Survey, Branch of Geophysics potential-field software package (Cordell and others, 1992). There are over 100 programs in this package and include functions to prepare interpretive and derivative products from potential field grids, and to extract data from the grids to be used for modeling. This software package may be obtained from the USGS Open-File Services section.

DATA COMPILATION

The 3 aeromagnetic grids accompanying this report were extracted from a single merged grid covering the entire state of New Jersey. Total-intensity aeromagnetic data for the merged grid was obtained from 26 different surveys (figure 2). Flight-line elevations ranged from 400 to 500 feet (122 m to 152 m) above ground and flight-line spacings ranged from 0.25 mi to 3.0 mi (0.4 km to 4.8 km). Four surveys (A, B, F, and Z on figure 2) were acquired digitally; all others were digitized from previously published 1:24,000 and 1:31,680 scale contour maps (table 1). Much of the pre-1975 data are available only on hand-contoured maps. These maps were digitized at flight-line and contour-line intersections, which is considered to be the most accurate method of recovering the original data (McCafferty, 1992).

Each data set was projected using the Universal Transverse Mercator (UTM) projection (base latitude 0° N and central meridian 75° W), then gridded using a minimum curvature algorithm (Webring, 1981) at a grid spacing which varied from 1/4 to 1/3 of the original flight-line spacing. For each data set, the appropriate geomagnetic reference field model was used to remove the core field component as computed at the time and altitude of the original survey (table 1). The altitude at each grid point was obtained from a digital elevation model with a constant added to each point equal to the aircraft terrain clearance.

After removal of the geomagnetic field, each grid was further processed in order to create one single uniform data set observed on a draped surface 500 ft (152.4 m) above ground. Three surveys (A, B, and F on fig. 1) were flown at an altitude of 400 feet above ground, all of the other surveys were flown at an altitude of 500 feet above ground. Because of this inconsistency, surveys A, B, and F were continued upward to 500 feet using standard fast Fourier transforms (Hildenbrand, 1983). The amount of upward continuation is small enough that it results in minimal signal loss.

After reducing each grid to a common altitude, each data set was regridded to a common grid interval. Adjacent surveys were digitally compared and constant values were added to bring intensity levels for adjacent surveys into agreement. The grids were then merged using smoothly weighted averages in the areas of overlap (program JMRG, Cordell and others, 1992). The data were then machine contoured (Godson and Webring, 1982). Some difficulty in joining grids is expected owing to differences in resolution, geomagnetic field removal, and data reduction of the original surveys. Gradients aligned along flight-line directions may reflect survey boundary mismatches or may represent unresolved problems with the original flight lines of a survey.

DESCRIPTION OF DISKETTES

The three 5-1/4 inch high density (1.2 megabyte) diskettes in IBM-PC format each contain one binary data file.

Disk 1: Text of this report (of.txt)

The northernmost grid (north.grd)

Disk 2: The central grid (central.grd)

Disk 3: The southernmost grid (south.grd)

See figure 1 for the location of each grid.

The specifications of each grid are as follows:

File name	# bytes	NC	NR	Xo (km)	Yo (km)	grid interval (km)
north.grd	749154	468	393	-21.25	4483.00	0.25
central.grd	724646	528	337	-43.00	4399.75	0.25
south.grd	992536	567	430	-54.50	4293.25	0.25

NC = number of columns

NR = number of rows

Xo = X origin of lower left corner of the grid from central meridian

Yo = Y origin of lower left corner of the grid from base latitude

Table 1 - Survey specifications used in this report

Area[1]	Flight Line dir.	Flight alt.[2] (ft)	Flight Line spacing (miles)	year(s) flown	Reference cited	Data type[3]	Magnetic field model used[4]
A	E-W	400 AG	3.0	1976-77	(LKB Resources, 1978b)	Digital	1965
B	NW-SE	400 AG	0.25	1978	(LKB Resources, 1980)	Digital	1965
C	N-S	500 AG	0.25	1951	(Henderson and others, 1962)	Analog	1966
D	E-W	500 AG	0.5	1963	(Philbin and Kirby, 1964d)	Analog	1965
E	E-W	500 AG	0.5	1963	(Philbin and Kirby, 1964c)	Analog	1965
F	E-W	400 AG	3.0	1976-77	(LKB Resources, 1978a)	Digital	1965
G	N-S	500 AG	0.25	1951	(Henderson and others, 1958f)	Analog	1966
H	N-S	500 AG	0.25	1951	(Henderson and others, 1963)	Analog	1966
I	E-W	500 AG	0.5	1963	(Philbin and Kirby, 1964a)	Analog	1965
J	E-W	500 AG	0.5	1963	(Philbin and Kirby, 1964b)	Analog	1965
K	N-S	500 AG	0.5	1963	(Boynton and others, 1966b)	Analog	1965
L	N-S	500 AG	0.5	1963	(Boynton and others, 1966c)	Analog	1965
M	N-S	500 AG	0.25	1955	(Andreasen and others, 1963b)	Analog	1965
N	N-S	500 AG	0.25	1950	(Henderson and others, 1958e)	Analog	1966
O	N-S	500 AG	0.25	1951	(Henderson and others, 1958c)	Analog	1966
P	N-S	500 AG	0.25	1956	(Bromery and others, 1960)	Analog	1965
Q	N-S	500 AG	0.5	1963	(Boynton and others, 1966d)	Analog	1965
R	N-S	500 AG	0.25	1955	(Andreasen and others, 1963a)	Analog	1965
S	N-S	500 AG	0.25	1955	(Andreasen and others, 1963c)	Analog	1965
T	N-S	500 AG	0.25	1950	(Henderson and others, 1958d)	Analog	1966
U	N-S	500 AG	0.25	1950	(Henderson and others, 1958a)	Analog	1966
V	N-S	500 AG	0.25	1950-51	(Henderson and others, 1958b)	Analog	1966
W	N-S	500 AG	0.5	1963	(Boynton and others, 1966e)	Analog	1965
X	N-S	500 AG	0.5	1963	(Boynton and others, 1966f)	Analog	1965
Y	N-S	500 AG	0.5	1963	(Boynton and others, 1966a)	Analog	1965
Z	E-W	500 AG	1.0	1978	(U.S. Geological Survey, 1979)	Digital	1975

[1] Area refers to figure 2.

[2] Flight altitude: AG refers to a "drape" survey flown at a constant elevation above ground.

[3] Data type: Analog, data exists in analog form only - maps were subsequently digitized from hand contoured published maps; Digital, survey data recorded digitally.

[4] Field model used: 1965 - IGRF-65 (Fabiano and Peddie, 1969);
1975 - IGRF-75 (Barraclough and Fabiano, 1978);
1966 - Goddard Space Flight Center (GSFC) field (Cain and others, 1967).

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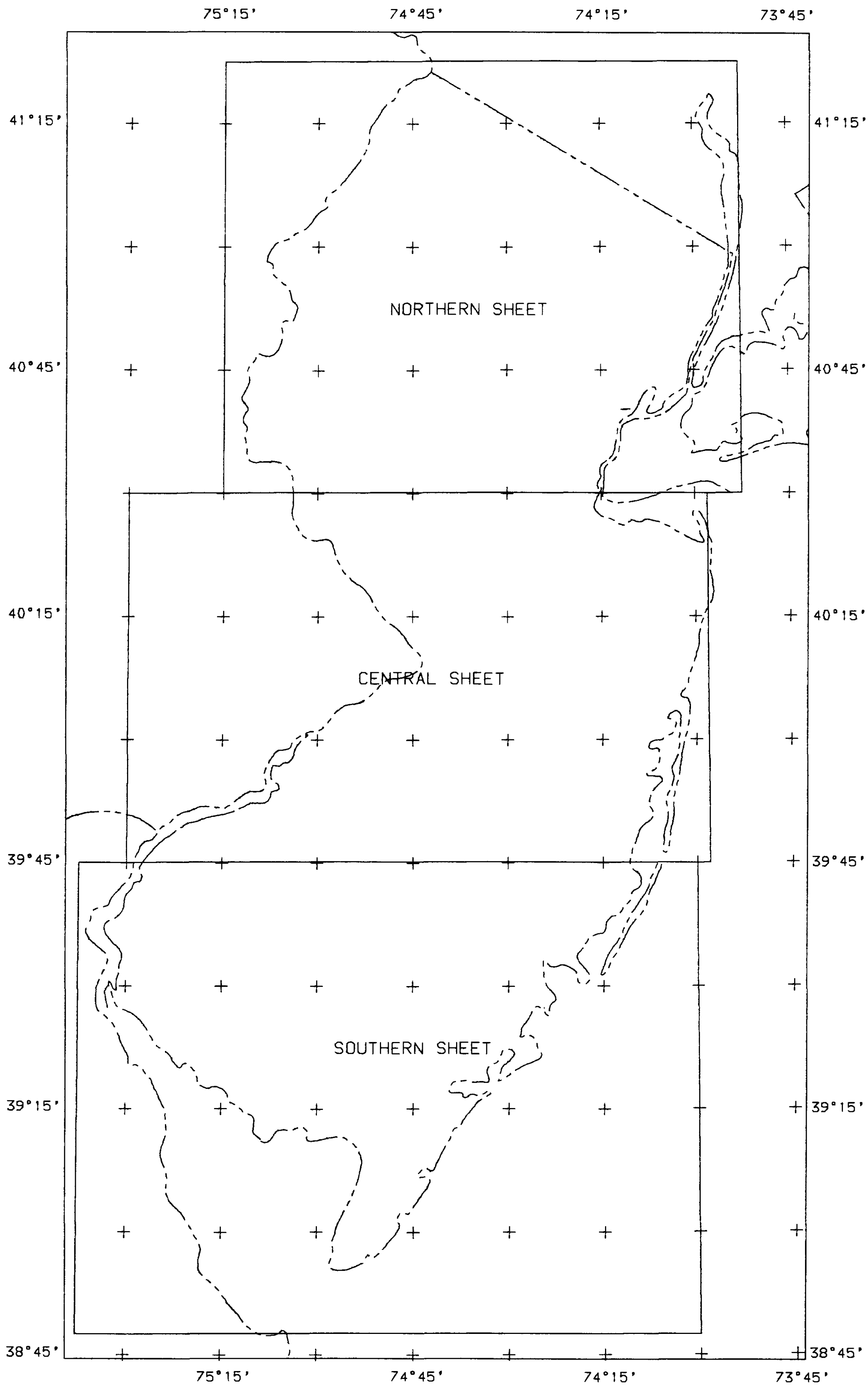

Figure 1. Index map of New Jersey showing location of the three grids.

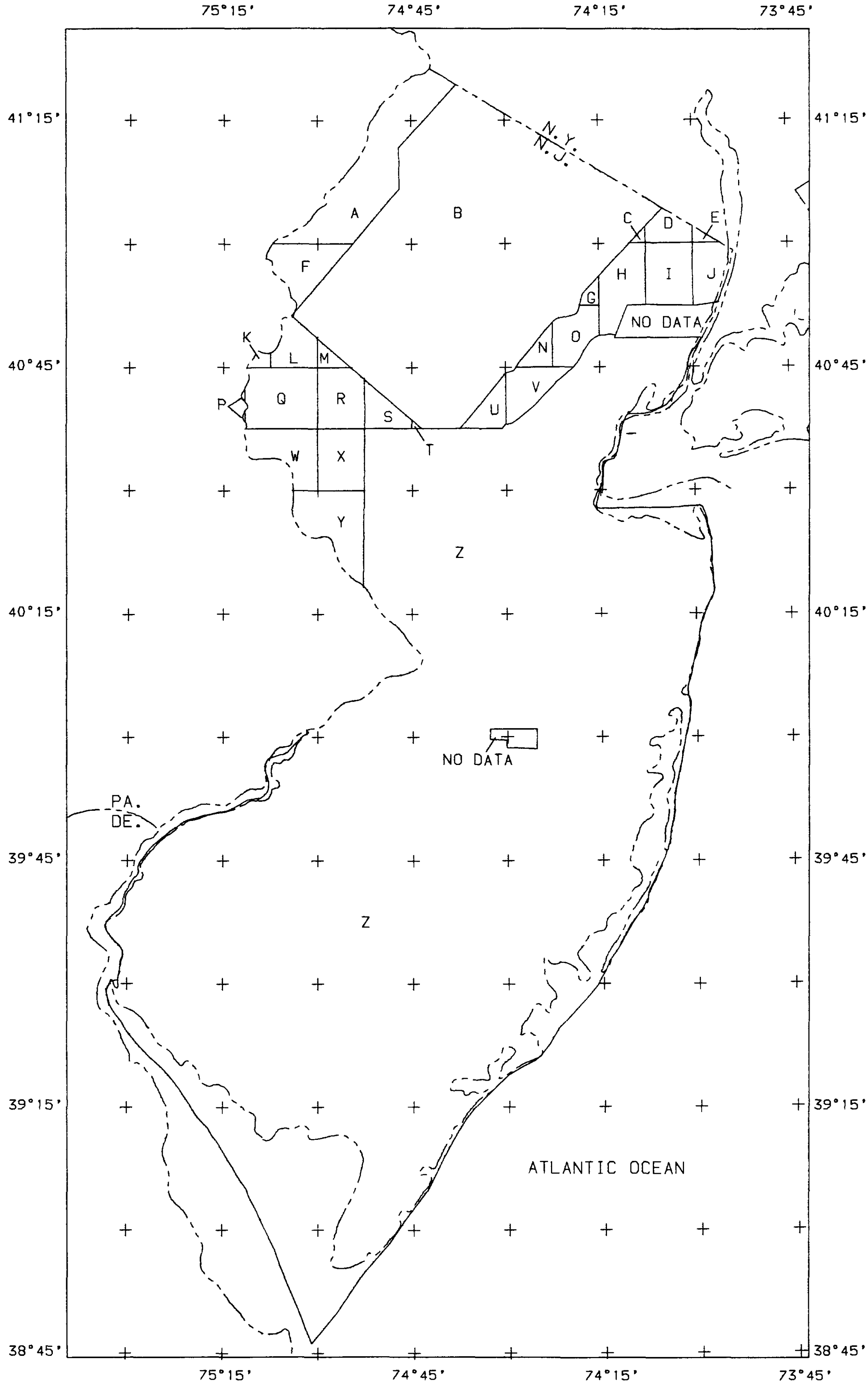

Figure 2. Map showing locations of aeromagnetic surveys used in the compilation of the grids. Survey specifications are summarized in table 1.