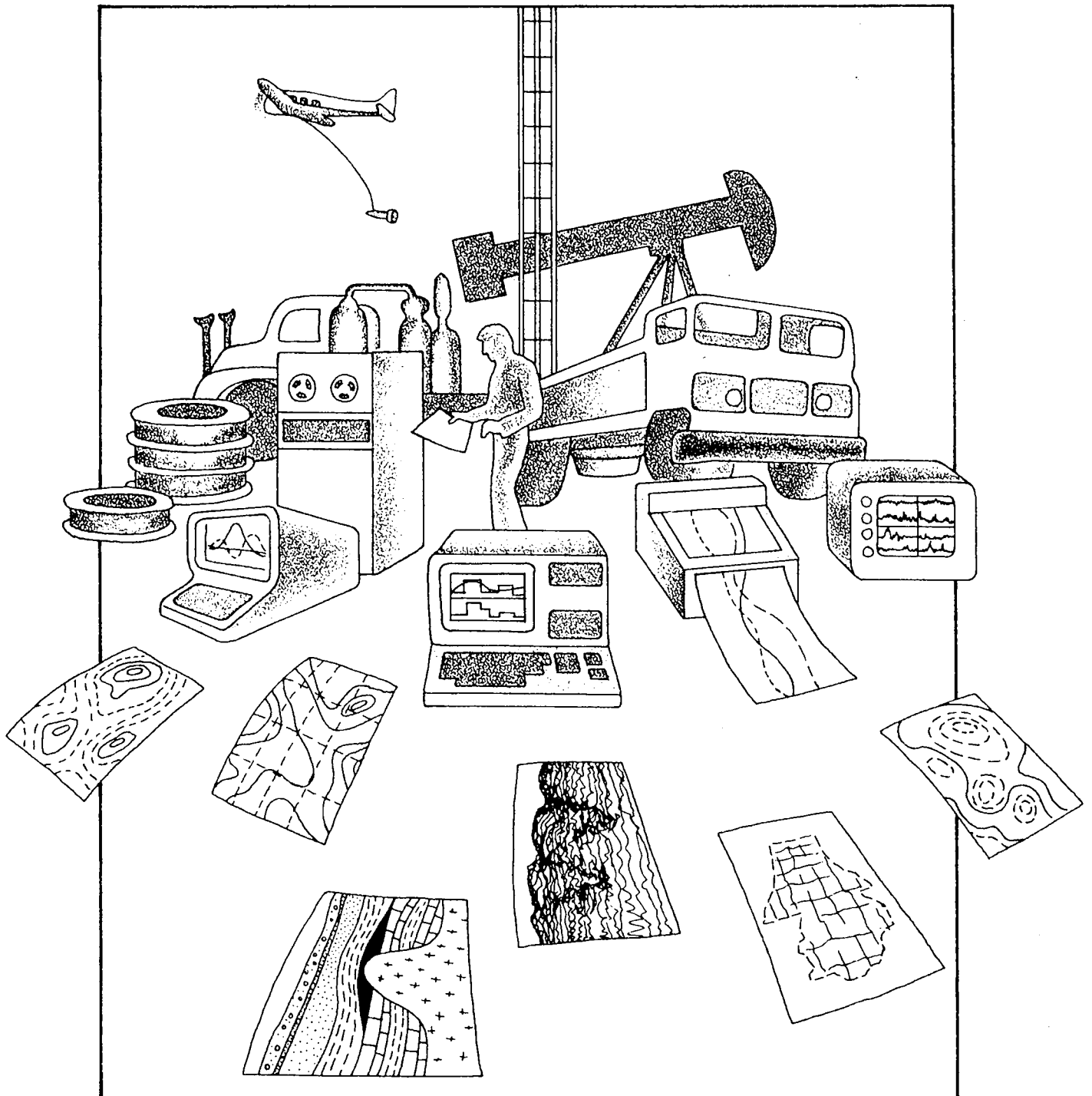




TERRESTRIAL GEOPHYSICS DATA SERVICES AND PUBLICATIONS

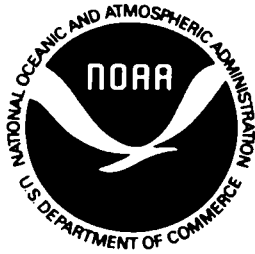
KEY TO GEOPHYSICAL RECORDS DOCUMENTATION NO. 17



KGRD CATALOG SERIES

Listed below are catalogs published in the Key to Geophysical Records Documentation (KGRD) series. Those without an asterisk (*) may be obtained from the National Geophysical Data Center, NOAA, Code E/GC1, 325 Broadway, Boulder, Colorado, USA, 80303; if preceded by an asterisk, from the National Technical Information Service, U.S. Department of Commerce, Springfield, Virginia, USA, 22161.

- KGRD No. 1, Marine Geophysical Data Catalog (superseded by KGRD No. 4).
- *KGRD No. 2, Catalog of Strong-Motion Seismograph Stations and Records (NTIS No. COM-74-10714).
- KGRD No. 3, Catalog of Earthquake Photographs (superseded by KGRD No. 7).
- KGRD No. 4, Marine Geophysical Data Catalog--1975 (superseded by KGRD No. 11).
- *KGRD No. 5, Earthquake Data File Summary (NTIS No. PB-265445).
- *KGRD No. 6, Bibliography and Index to Literature on Manganese Nodules (1874-1975) (NTIS No. PB-257218).
- KGRD No. 7, Catalog of Earthquake Photographs.
- *KGRD No. 8, Catalog of Digital Bathymetric Data for the United States Coastal Regions (NTIS No. PB81 133258).
- KGRD No. 9, Catalog of Seismogram Archives.
- KGRD No. 10, The Marine Geophysical Data Exchange Format--"MGD77".
- KGRD No. 11, Summary of Digital Marine Geophysical Data Holdings (Bathymetric, Magnetic, and Gravimetric Data).
- KGRD No. 12, Thermal Springs List for the United States.
- KGRD No. 13, Catalog of Tsunami Photographs.
- KGRD No. 14, Marine Geology and Geophysics Data Services and Publications.
- KGRD No. 15, Earthquake Data Services and Publications (including Tsunami).
- KGRD No. 16, Catalog of Geological and Geophysical Data for the National Petroleum Reserve in Alaska.
- KGRD No. 17, Terrestrial Geophysics Data Services and Publications.
- KGRD No. 18, U.S. Land Gravity.



U.S. DEPARTMENT OF COMMERCE

Malcolm Baldrige, Secretary

NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION

John V. Byrne, Administrator

NATIONAL ENVIRONMENTAL SATELLITE, DATA, AND INFORMATION SERVICE

John H. McElroy, Assistant Administrator

**TERRESTRIAL GEOPHYSICS
DATA SERVICES AND
PUBLICATIONS**

KEY TO GEOPHYSICAL RECORDS DOCUMENTATION NO. 17

National Geophysical Data Center
Boulder, Colorado

1983

CONTENTS

	Page		Page
Introduction.....	1	Data Products and Services (cont.)	
Terrestrial (Land) Geophysics Data Bases.....	1	Geothermal Data.....	14
Announcements of Data Availability.....	1	Volcanoes.....	14
Information for Ordering.....	1	Geothermal Energy.....	15
Data Products and Services.....	2	World Heat Flow.....	16
Multichannel (CDP) Seismic Data.....	2	Geochemical Data.....	18
Gravity.....	3	Rock Analysis Storage System.....	18
Topography.....	5	PETROS.....	18
Geological Data.....	5	Radiometric Age Data Bank.....	18
Well Logs--Land.....	5	Coal Resources.....	21
Well Logs--Marine.....	9	National Petroleum Reserve in Alaska.....	21
Geomagnetic Data (Solid Earth).....	9	Publications.....	21
Earth Surface Data.....	9	Geomagnetism.....	21
Airborne (Aeromagnetic Survey) Data.....	11	National Petroleum Reserve in Alaska.....	22
Satellite Magnetic Survey Data.....	13	Gravity.....	22
Mathematical Models of Magnetic Field....	13	Geothermics.....	23
		Seismology.....	23
		Marine Geology and Geophysics.....	23
		List of Data Announcement Fliers.....	23

TERRESTRIAL GEOPHYSICS DATA SERVICES AND PUBLICATIONS

INTRODUCTION

The National Oceanic and Atmospheric Administration (NOAA) is responsible for collecting, managing, and disseminating many kinds of data that result from man's inquiry into his environment. The National Geophysical Data Center (NGDC) is one of the data-management centers of NOAA. Other centers are the National Oceanographic Data Center in Washington, D.C., and the National Climatic Center in Asheville, N.C.

NGDC data-file holdings range from the disciplines of solid-earth geophysics (seismology, geomagnetism, gravity, marine geology and geophysics) to the disciplines of solar-terrestrial physics, which describe the influences on the Earth of the sun, solar activity, and the interplanetary medium. NGDC also operates World Data Centers A for: Solid Earth Geophysics, Marine Geology and Geophysics, Solar-Terrestrial Physics, and Glaciology under the auspices of the National Academy of Sciences and the International Council of Scientific Unions (ICSU).

This brochure briefly describes NGDC data products and services that relate to terrestrial geophysics (excluding earthquake seismology and tsunamis, which are the subjects of the "Earthquake Data Services and Publications" booklet). Inquiries about any of the data sets discussed here should be sent to the address below (see "Information for Ordering") unless otherwise indicated.

Terrestrial (Land) Geophysics Data Bases--General

NGDC, the national and international repository for many data bases that relate to terrestrial geophysics, is the focal point for data dissemination and customer services. The geophysical and related geochemical and geological data bases include data of multichannel seismic reflections (CDP), well logs, coal, geomagnetism, gravity and topography, radiometric age, rock analyses, geothermal sources, heat flow, and volcanoes.

Data from Government agencies, U.S. and foreign universities, research centers, and other organizations are provided to NGDC through data-exchange agreements or other arrangements. After quality-control, processing, and documentation procedures, new data are advertised through announcement fliers (see p. 23), catalogs (see p. 21), and other means. The media in which data are provided depend on the kind of data and on the original format acquired. Many digital data bases are held on magnetic tape or computer

disk, but analog data (strip charts) that support data bases such as seismic reflection and well logs also are available. Formats in which data are provided include magnetic tape, plots, paper printouts, and computer-output microfilm (COM) for computer data bases; and paper copies (blackline or sepia), transparent plastic copies, or microform for analog data bases. Available formats are announced in the data announcement fliers or catalogs for specific data bases.

Announcements of Data Availability

Data announcement fliers often are issued to advise the public of the availability of new data sets. These announcements, which contain brief summaries of data sets, include source, description, geographical coverage, dates, and specific ordering information. A current list of fliers is given on page 23. Summary catalogs also describe specific data sets and services (see p. 21).

NGDC maintains mailing lists that are used to announce the availability of new data in all disciplines. Data announcement fliers and other materials are mailed to names on these lists as new data become available. You may request that your name be added to specific mailing lists by writing NGDC.

Information for Ordering

It is usually most convenient for customers to order specific data from the announcement flier or catalog in which the detailed ordering information is provided. Data inventories or other information are often provided free of charge in anticipation of a later order that may result from the inquiry. Wherever possible, the data set identification numbers (Item Nos.) are also shown to facilitate inquiries about specific data holdings. Orders and inquiries about data and their prices may be made by phone: (303) 497-6541 or FTS 320-6541; or by mail:

National Geophysical Data Center
NOAA-E/GC1
325 Broadway
Boulder, CO 80303 USA

If requesting data on magnetic tape, please specify number of tracks, density (800, 1600, or 6250 BPI), EBCDIC or ASCII, and blocking factor (maximum characters per block is 5120), or unblocked. The standard tape format is 9 track, 1600 BPI, ASCII.

DATA PRODUCTS AND SERVICES

Multichannel (CDP) Seismic Data*

NGDC holds many data sets that contain seismic data from the National Petroleum Reserve in Alaska (NPRA) (see p. 21). Customers should request a copy of catalog KGRD-16 to enable them to specify the data sets they require. The "Contents" page from KGRD-16 (see table 1) conveys the scope of the catalog, which contains not only seismic data from the NPRA region but also well-log, gravity, aerial gamma-ray, and magnetic survey data. All NPRA data were collected for the U.S. Navy and the U.S. Geological Survey by contractors between 1972 and 1981.

Table 1. Contents page from NPRA catalog

I.	Introduction
II.	Seismic Data <ul style="list-style-type: none"> CDP Seismic-Reflection Data Reprocessed Seismic Sections Seismic-Reflection Field Tapes Processed Field Tapes Miscellaneous Geophysical Data Tapes Barrow Data
III.	Well-Log Data <ul style="list-style-type: none"> Well Logs Digitized Well Logs Well-Core Analyses Seismic Velocity Surveys Synthetic Seismograms Palynology/Micropaleontology Reports
IV.	Other Data <ul style="list-style-type: none"> Gravity Data Aerial Gamma-Ray and Magnetic Survey Data
V.	Geological and Geophysical Data Reports <ul style="list-style-type: none"> Summary Geophysical Reports Summary Geologic Reports Miscellaneous Geologic Reports
VI.	Price List

*A program for mapping geologic structure produces seismic reflection profiles by creating seismic waves and observing arrival times of the reflected waves. The energy source for creating the waves is usually impulsive (i.e., a dynamite blast), but when the Vibroseis method is used, energy is introduced over a considerable period of time. Common depth point (CDP) refers to a situation where the same portion of the subsurface produces reflections at different offset distances on several profiles. Different geophone combinations record the same reflection from the same subsurface. The term "multichannel seismic reflection" is synonymous with "common depth point."

Figure 1, taken from the NPRA catalog, depicts the coverage of CDP seismic survey lines and documentation throughout NPRA for 1972-81. Represented are about 13,000 line miles (about 21,000 km) of seismic survey data. CDP survey lines were shot at 6-, 12-, or 24-fold multiplicity. Full-scale (5-in./s) sections are available for most of the lines as sepia mylar or blackline (paper or mylar). Microfilm copies of processed sections or demultiplexed digital field tapes (in SEG-Y format) are also available. Supportive documentation includes velocity profiles, shot-point maps, survey notes, and observer logs. Squashed reprocessed data compressed to a scale identical to 1:125,000 regional maps are available for about 55 of the line sections shown in figure 1.

The catalog also provides detailed information about data formats, ancillary data, and prices (see "Publications," p. 21).

Additional land CDP seismic-reflection data for other areas are available in sections or in digital tape formats as described in table 2.

Table 2. Additional NGDC seismic-reflection data

Item No.	Name	Location	Approx. length of seismic line
			km
TGX-0090	Appalachian Overthrust.	NE. Tennessee, NW. North Carolina	130
TGX-0100	NE Mississippi Embayment (New Madrid Fault Zone).	SE. Missouri, NE. Arkansas, NW. Tennessee	280
TGX-0110	Charleston----	E. South Carolina	140
TGX-0150	Red Bird-----	E. central Wyoming	28
TGX-0160	Inuit-----	N. central Alaska (adjacent to NPRA)	164

Documentation for these data sets includes location maps, and, typically, velocity analyses and descriptive texts. Inquirers should request data announcement fliers for the specific item number.

NGDC also holds extensive collections of marine seismic data in the "Underway Geophysics Data File." This file consists of about 3.4 million nautical miles of single-channel seismic profiles, 65,000 nautical miles of multichannel profiles, and 400,000 nautical miles of side-scan refraction profiles, which were recorded along survey ship track lines. Inquiries about these data can be sent to NGDC.

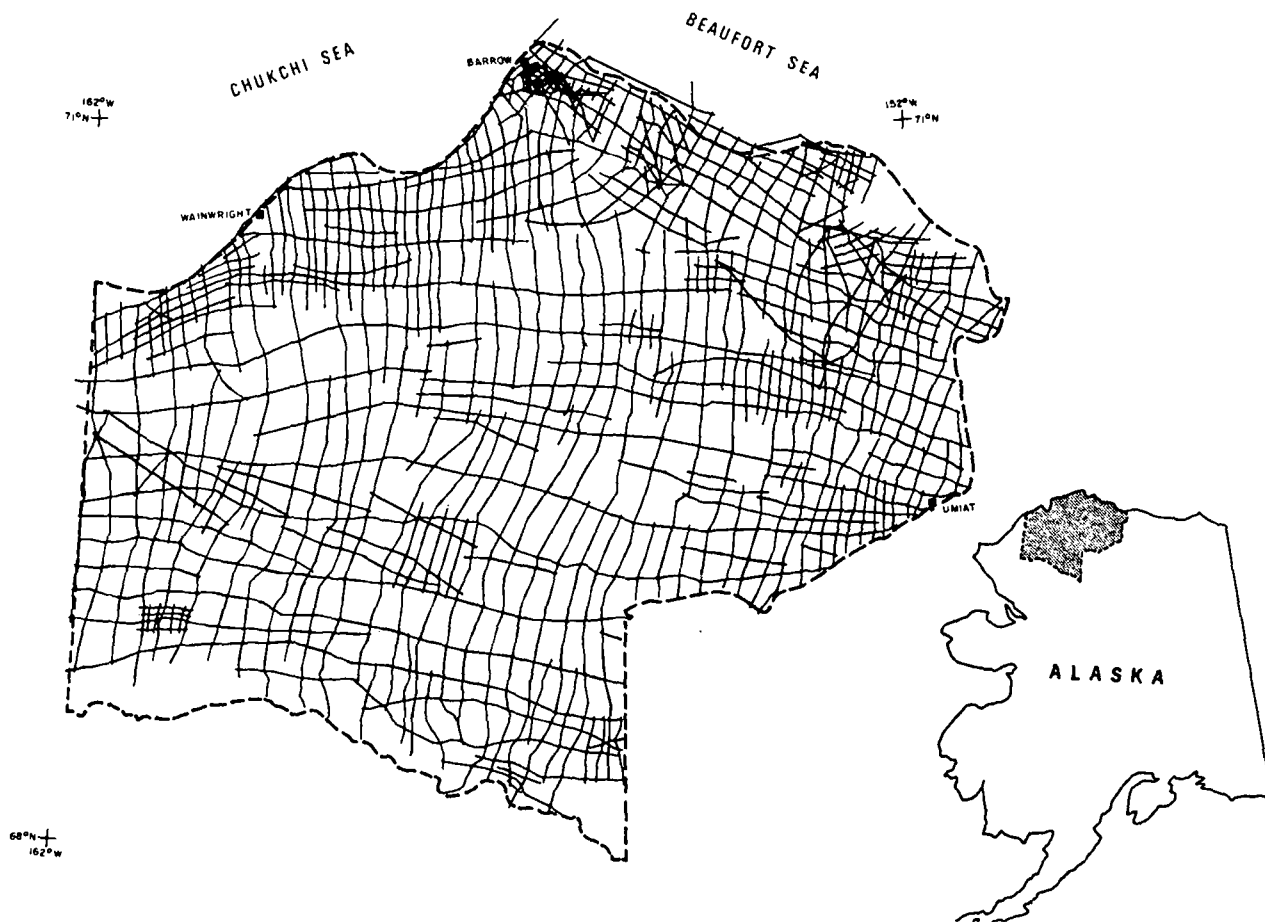


Figure 1. Map showing locations of seismic-reflection and gravity data from the National Petroleum Reserve in Alaska (NPRA). Inset shows location of NPRA.

Gravity

Gravity data in the United States are compiled by the Defense Mapping Agency (DMA) of the Department of Defense. DMA acquires data from many sources, which include other Government agencies, State organizations, academic institutions, and private industry. DMA organizes the data into a standard format on magnetic tape, which is then furnished to NGDC by the DMA Gravity Library for public dissemination.

The gravity data file (Item No. TGR-0100) contains data for more than 605,000 stations in the conterminous United States. Types of data and their precision are:

Values	Precision	Reference
Observed gravity	0.01 mgal	IGSN-71*
Free-air anomaly	0.1 mgal	IAG-67**
Bouguer anomaly	0.1 mgal	Rock density = 2.67 g/cm ³

*International Gravity Standardization Net of 1971

**International Association of Geodesy, 1971, Geodetic Reference System, 1967, International Association of Geodesy Special Publication No. 3, 116 p.

Supplemental data include latitude and longitude (precision 0.0001°); elevation (precision 0.1 m or 0.1 ft); standard deviation for the free-air and Bouguer anomalies; and documentation reference numbers (e.g., DMA Gravity Library source number, base reference station, and gravity sequence number).

NGDC furnishes a printout with the data, which provides an abbreviated bibliographic reference for all source documentation reference numbers in the data package.

Figure 2 shows the distribution of gravity observations, which are available to the public, for the conterminous United States.

Data from this file are available in three formats: magnetic tape, computer printout, and geophysical data plots. The entire file may be obtained on magnetic tape, or an area search delimited by latitude and longitude boundaries (top, bottom, left, and right) can be generated. Computer printout can be furnished either on paper or on microfilm (COM); however, because of the high costs, computer printout is used only for area searches. Geophysical data plots (see fig. 3) customized to the needs of the customer also are produced. They include both point value and contour graphics, and can display any of the following: total gravity, free-air gravity, Bouguer gravity, or point topography.

Another recently acquired gravity data set consists of the National Geodetic Survey (NGS) gravity observations (Item No. TGR-0150). This file contains about 750,000 gravity stations and has terrain corrections for the United States and Alaska. Types of data and their precision are (see p. 5):

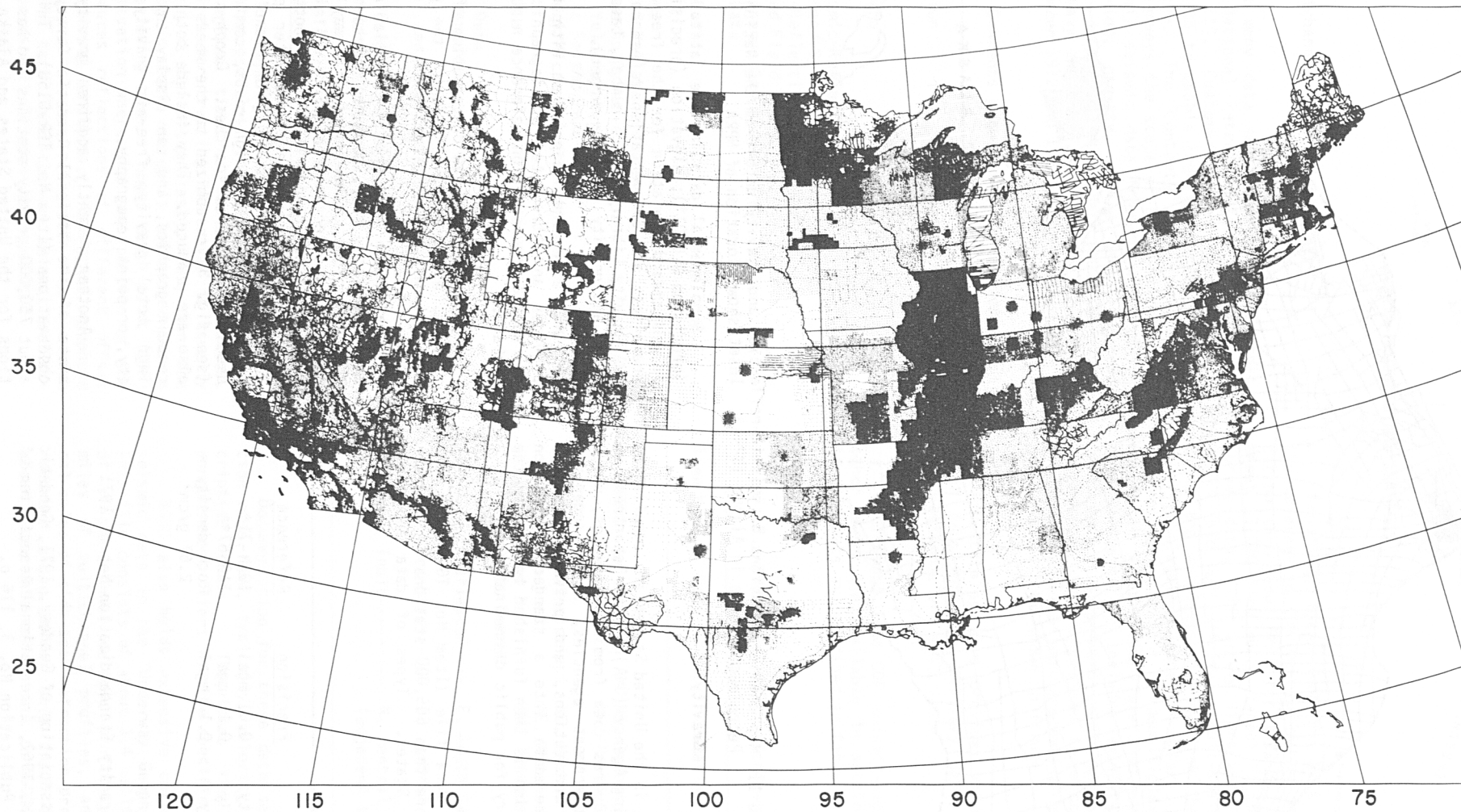


Figure 2. Map showing distribution of gravity observations for conterminous United States.

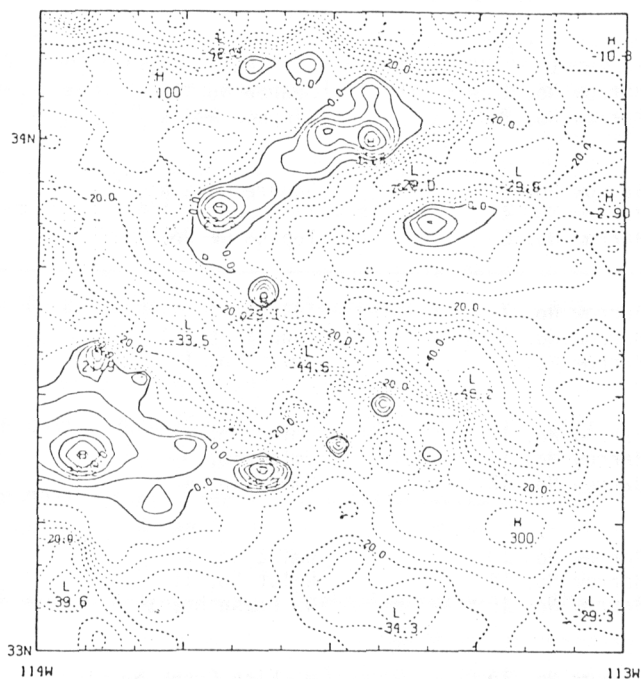


Figure 3. Example of gravity anomaly plot (Values in mgal).

data by Ohio State University. Included are free-air anomaly and geoid undulations data (measured in mgals) and elevation observations.

A digital gridded gravity data base for the conterminous United States (Bouguer anomaly) and continental shelf (free-air anomaly) is available on magnetic tape. The gridded data base, which was constructed by the USGS from the digital DMA land gravity data described above, has a value for each 4 km by 4 km interval. Data from areas with substantial relief were terrain corrected. The gridded data base was machine contoured to produce the "Gravity Anomaly Map of the United States (exclusive of Alaska and Hawaii)," which was published by the Society of Exploration Geophysicists (P.O. Box 3098, Tulsa, OK 74101) in 1982.

The marine data, along with other geophysical data, are held in the digital marine geophysical data base. This file contains about 3.2 million nautical miles of gravity values that were taken along survey ship track lines.

For detailed information on U.S. land gravity, request publication KGRD-18.

Topography

NGDC obtains topographic data from several U.S. Government agencies, academic institutions, and industrial organizations. These data consist of elevations or depths (usually in meters or feet) that have an accuracy typically of 10 to 20 m (table 3). Data are normally held and disseminated on magnetic tape. The last three data sets in table 3 are bathymetry data of the world's ocean areas. The digital marine geophysical data base (underway geophysical data) contains about 6.6 million nautical miles of bathymetry data (see figs. 4 and 5). NGDC also holds about 30 million precise depth soundings on the U.S. continental margins.

Geological Data

Well Logs--Land

NGDC has well-log and associated information for 74 wells drilled between 1946 and 1953, and 1974 and September 1981, on the North Slope of Alaska in the NPRA. These data are records of one or more physical measurements as a function of depth in a borehole. Distinction is sometimes made between a log as an entire record, which may contain curves that show several measurements, and the individual curves themselves, which are also called logs. The map in figure 6 shows the locations of many of the wells. Not shown are an additional seven privately drilled wells just east of NPRA (i.e., east of the Colville River). There is a total of 78 wells, but NGDC does not hold complete data on all of them; however, additional data on wells are continuing to be received from USGS. Information on data available from specific wells may be requested from NGDC. Types of data now available include:

Values	Precision	Reference
Observed gravity	0.001 mgal	IGSN-71*
Free-air anomaly	0.1 mgal	IAG-67**
Bouguer anomaly	0.1 mgal	Rock density = 2.67 g/cm ³
Terrain correction (if available)	0.1 mgal	

*International Gravity Standardization Net of 1971

**International Association of Geodesy, 1971, Geodetic Reference System, 1967, International Association of Geodesy Special Publication No. 3, 116 p.

Supplemental data include latitude and longitude (precision 0.0001°); elevation (precision, 0.1 m or 0.1 ft); standard deviation for the free-air and Bouguer anomalies; and codes for quality, contributing agency, and source.

Gravity data from NPRA as well as marine gravity data from both continental shelf and deep ocean areas also are available.

The NPRA gravity data (Item No. TGR-0010) consist of free-air and Bouguer (non-terrain corrected) observations from more than 53,000 stations. These data, which were collected during 1974-80 along with seismic reflection data, were provided to NGDC by the U.S. Geological Survey (USGS). A 36-page report describes the gravity data, which is held on magnetic tape or microfilm, and documents the data tape and the NPRA gravity program.

Item No. TGP-0040 contains gravity data for the world on a 1° by 1° grid as well as geodetic observations compiled from GEOS-III satellite altimetry

DATA TYPES:

Borehole Compensated Sonic Log
 Casing Collar Log/Perforating Log
 Cement Bond Log
 Compensated Formation Density Log
 Compensated Neutron Formation Density Log
 Computed Log
 Continuous Dipmeter Arrow Plot
 Coriband
 dc Exponent Log
 Digitized Log
 Dual Induction Laterolog-Composite Lithology
 Dual Induction Laterolog
 Dual Laterolog
 Formation Density Log
 Gamma-Ray Log
 Geogram
 Induction Electrical Log
 Lithology Log
 Microlaterolog
 Mud Log
 Polar Frequency Plots
 Pressure Analysis Log
 Proximity Log-Microlog
 Saraband
 Stratigraphic Dipmeter
 Strip Log
 Temperature Log

AUXILIARY INFORMATION:

Crude Oil Analyses
 Daily Geological Report
 Dipmeter Interpretation
 Gas Analyses
 Geochemical Data
 Geologic Reports
 History of Drilling Operations
 Information Test Reports
 Water Analyses

Names of wells (cont.):

Peard No. 1	S. Simpson No. 1
S. Barrow No. 1	Seabee No. 1
S. Barrow No. 2	Simpson No. 1
S. Barrow No. 3	Square Lake No. 1
S. Barrow No. 4	Titaluk No. 1
S. Barrow No. 6	Topagoruk No. 1
S. Barrow No. 7	Tulageak
S. Barrow No. 8	Tunalik No. 1
S. Barrow No. 9	Umiat No. 1
S. Barrow No. 10	Umiat No. 2
S. Barrow No. 11	Umiat No. 3
S. Barrow No. 12	Umiat No. 4
S. Barrow No. 13	Umiat No. 7
S. Barrow No. 14	Umiat No. 11
S. Barrow No. 15	W. Dease No. 1
S. Barrow No. 16	W. Fish Creek No. 1
S. Barrow No. 17	W. T. Foran No. 1
S. Barrow No. 18	Walakpa No. 1
S. Barrow No. 19	Walakpa No. 2
S. Barrow No. 20	Wolf Creek No. 1
S. Harrison Bay No. 1	Wolf Creek No. 2
S. Meade No. 1	Wolf Creek No. 3

*Non-NPRA wells.

The names of the wells are:

Amoco Aufeis No. 1*	Iko Bay No. 1
Atigaru Pt. No. 1	Ikpikpuk No. 1
Avak No. 1	Inigok No. 1
Awuna	J.W. Dalton No. 1
Cape Halkett No. 1	Kaolak No. 1
Drew Pt. No. 1	Kemik Unit No. 1*
E. Oumalik No. 1	Kiluktak
E. Simpson No. 1	Knifeblade No. 1
E. Simpson No. 2	Knifeblade No. 2A
E. Teshekpuk No. 1	Kugrua No. 1
E. Topagoruk No. 1	Kuyanak
Fin Creek No. 1*	Lisburne No. 1
Fish Creek No. 1	Meade No. 1
Forest Lupine No. 1*	N. Inigok
Grandstand No. 1*	N. Kalikpik No. 1
Gubik No. 1*	N. Simpson No. 1
Gubik No. 2*	Oumalik No. 1

Well logs are available on sepia mylar, blackline paper or mylar, microfilm, or as digital tapes (formats include Schlumberger LISLOG, DRESSER, and DATOUT). Velocity data, synthetic seismograms, palynology and micropaleontology, species distribution charts, and well-core analyses are available for many of the wells. For additional information on NPRA well logs, consult the NPRA data catalog, KGRD-16.

NGDC also holds data on coal well logs for three fields in the continental U.S. These sets of data represent the result of the USGS national program to delineate tracts of coal and to evaluate coal resources in the public domain. See the section on "Coal Resources" for further information on these holdings.

Table 3. NGDC topographic data files

[Abbreviations used are: NGS = National Geodetic Survey, National Oceanic and Atmospheric Administration; USGS = U.S. Geological Survey; DMA = Defense Mapping Agency, Department of Defense; SIO = Scripps Institute of Oceanography; Rand = Rand Corporation; OSU = Ohio State University; NORDA = U.S. Naval Ocean Research and Development Activity; NOS = National Ocean Survey, National Oceanic and Atmospheric Administration; n.m. = nautical mile; m/s = meters per second; and s = second]

Item No.	Spatial distribution	Coverage	Contributor	No. of records	Description
TGP-0022	30-s-----	Conterminous United States.	NGS	17X10 ⁶	Point values. Data are rounded to nearest 20 m. Accuracy to 30 m for smooth terrain, 50 m in regions of high topographic relief.
TGP-0031	30-s-----	-----do-----	USGS	17X10 ⁶	Average values obtained by averaging NGS data (Item No. TGP-0022).
TGP-0032	1-min. and 3-min.	-----do-----	USGS	4.3X10 ⁶ 0.5X10 ⁶	Average values obtained by averaging data of Item No. TGP-0031 over 1-min. and 3-min. areas.
TGP-0021	5-min.-----	North America---	DMA	100,470	Average values. Set consists of 6 tapes for: 0°0'-30°0'N, 30°0'-37°35'N, 37°35'-45°0'N 45°0'-52°35'N, 52°35'-60°0'N, and 60°0'-90°0'N.
TGP-0011	1-deg.-----	World-----	SIO	45,360	Average values, based on visual estimates from contour charts, for: 1° Lat. X 1° Long. for Lat. band 0°-49° 1° X 2° 50°-69° 1° X 5° 70°-79° 1° X 10° 80°-89°
TGP-0012	1-deg.-----	World-----	Rand	64,800	Average values, on a precise 1° grid. Used SIO data plus visual estimates from contour charts.
TGP-0013	1-deg.-----	World-----	DMA	64,555	Average values. About 15% of data was generated from 30'X30' data.
TGP-0014	1-deg.-----	Ocean areas between 65°N and 65°S.	DMA	28,920	Average values based on GEOS-III satellite radar altimetry. Each value is based on 32 altimetry points surrounding a 1°X1° surface element.
TGP-0040	1-deg.-----	World-----	OSU	27,500	Based on GOES-III satellite altimetry data; file also includes free-air gravity data and geoidal undulation data.
TGP-0040	30X30 n.m. sq. areas.	N. Pacific Ocean.	NORDA	29,250	Minimum, maximum, and average depths for 30X30 n.m. sq. areas, in uncorrected meters.
1980-SE-F	See description.	U.S. coastal waters.	NOS	27.5X10 ⁶	Tracking data, sorted by geographic coordinates and separated by 1° areas. Soundings and bottom characteristics, have geographic positions accurate to 0.01 s. 27.5 million records from surveys conducted 1930-65. See figure 4.
81-MGG-14	5-min.-----	N. Hemisphere oceans.	NORDA	6X10 ⁶	Data, from charts and other sources, interpolated onto a 5-min. longitude by meridional parts grid, or onto a 5-min by 5-min. grid. First one contains about 3.5 million data points; second one contains about 2.5 million data points. All depth values are in uncorrected meters based on 1500 m/s sound speed. See figure 5.

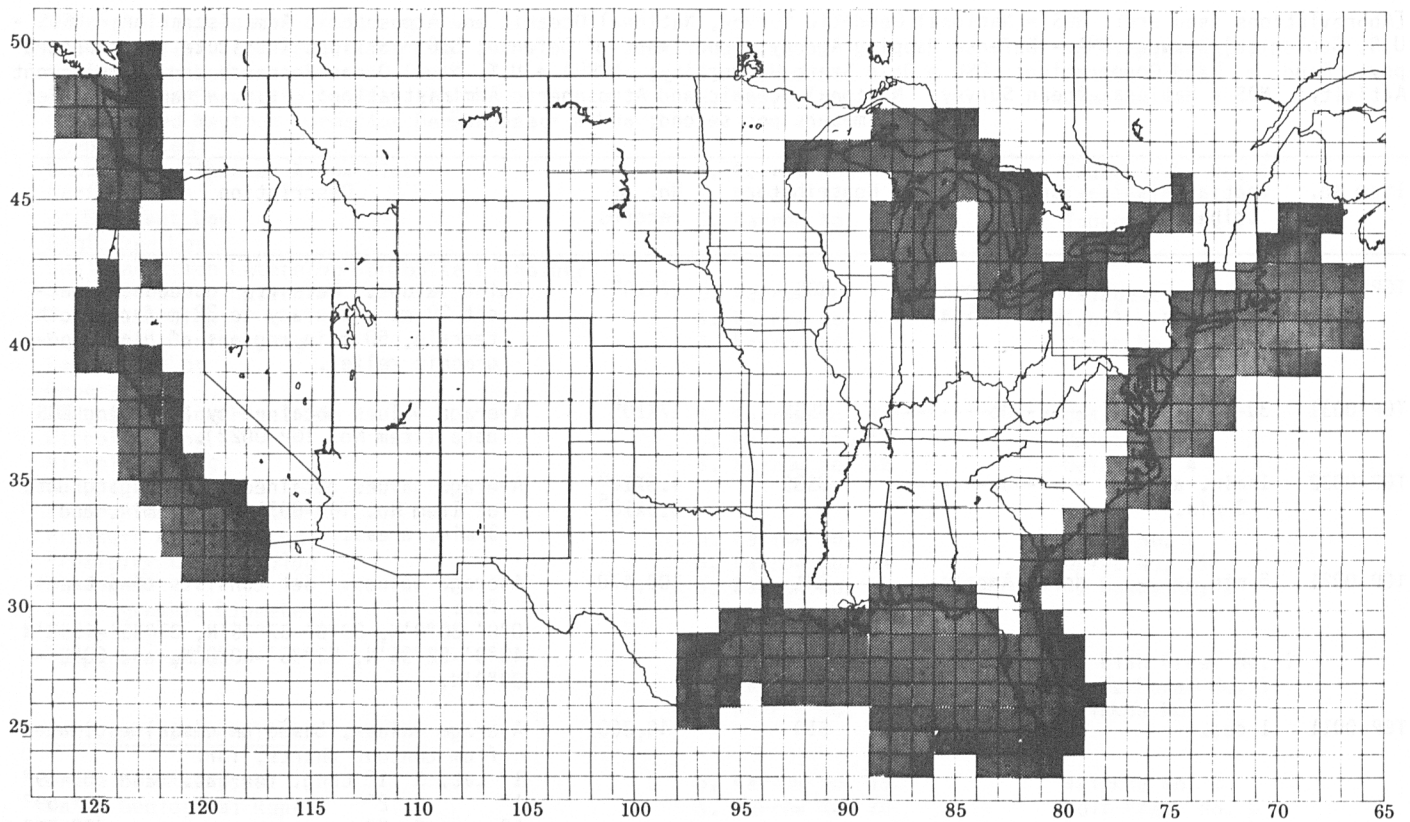


Figure 4. Map showing bathymetric coverage (1930-65 only) in continental United States.

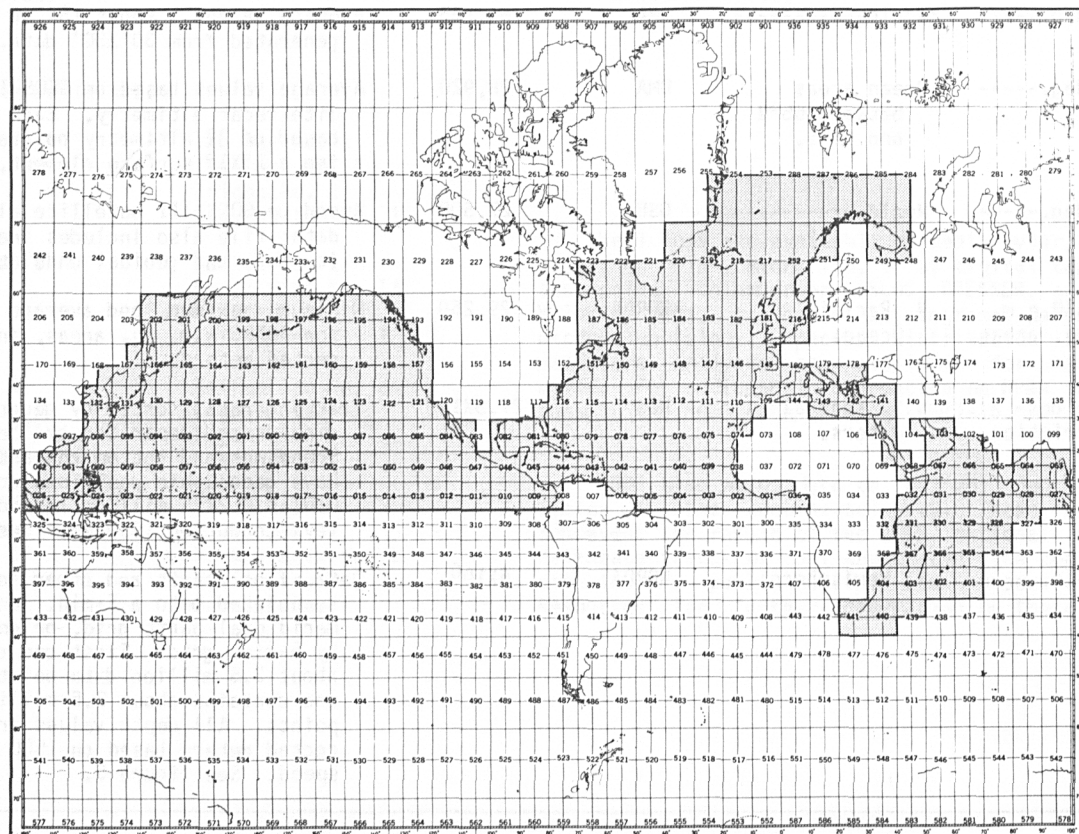


Figure 5. Map showing coverage of Synthetic Bathymetric Profiling System (SYNBAPS).

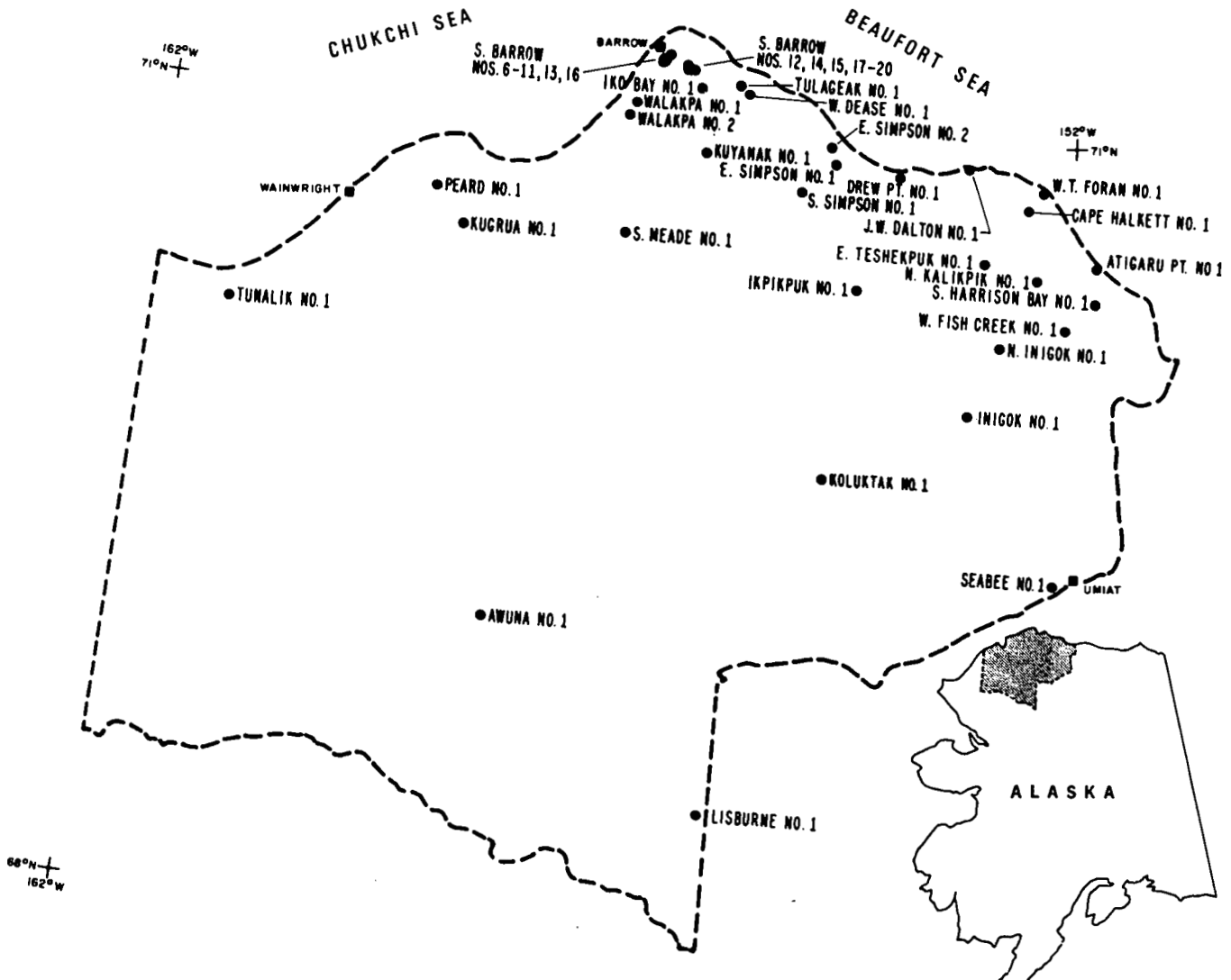


Figure 6. Map showing locations of some wells in National Petroleum Reserve in Alaska (NPR). Inset shows location of NPR.

Well Logs--Marine

The NGDC marine data base includes well-log data, core analyses, and auxiliary information mainly from wells drilled in the Gulf of Mexico, but also from relinquished and continental off-shore stratigraphic test (COST) wells on the East and West coasts of the U.S. and on the Alaskan outer continental shelves.

Geomagnetic Data (Solid Earth)

Basic geomagnetic data can generally be divided into Earth surface, airborne, or satellite observations. A fourth category of data is represented by the mathematical magnetic field models, which, depending on the model, may use data from any or all the other observations. All files are updated when new information is received.

Earth Surface Data

The Magnetic Field Survey Data (Item No. TGO-0070) contains the results of about 300,000 high-quality magnetic observations made at worldwide locations since 1900. At most locations three magnetic elements were observed (see table 4): either declination (D), dip (I), and horizontal intensity (H); or declination, horizontal intensity, and vertical intensity (Z). Where possible, the values for other magnetic elements, usually the north component (X), the east component (Y), and the total field component (F), were derived by computer. This file also includes summary data, typically annual means, from magnetic observatories where the changes in the magnetic field are continuously recorded. There are about 20 such observatories (fig. 7). This file is available on one reel of magnetic tape, and a listing can be provided of the source documents. Limited, selected searches can also be made for any State, country, geographic area, interval of time, or kind of observation.

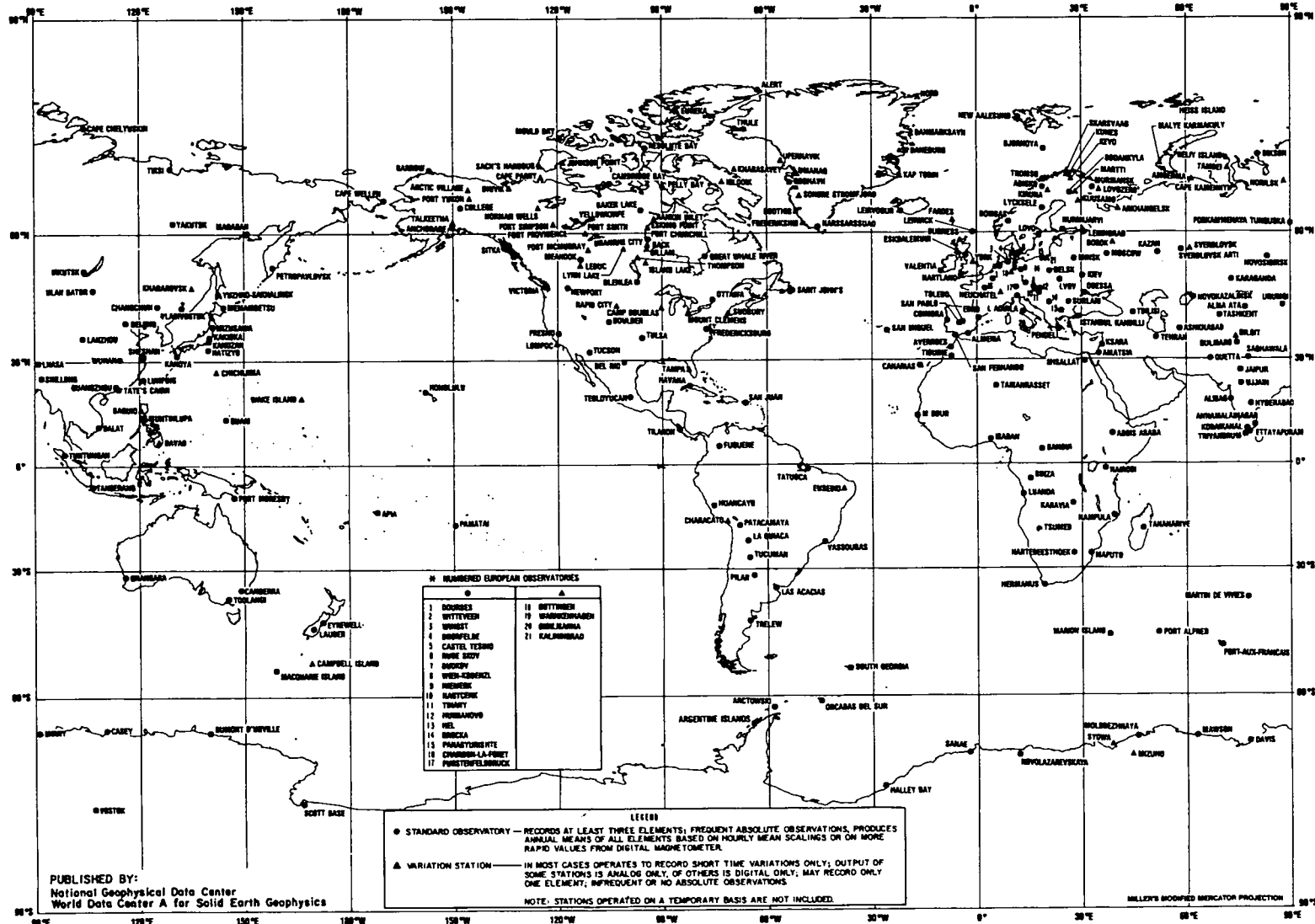


Figure 7. Map of magnetic observatories in operation in 1982.

Table 4. Example of listing from file of land magnetic field survey data

COUNTRY	STATION	LATITUDE	LONGITUDE	YR	MO	DA	D	I	H	Z	F	X	Y	GMT	ALT	C	SRC	SERIAL
TEXAS	HEREFORD	34 51.3	-102 19.4	68	12	16	11 23.9	63 17.2	24069	47828	53543	23594	4757		118	9	035200310715	
TEXAS	GROESBECK	31 31.5	-096 32.0	01	04	30	8 27.1	60 39.4	27463	48852	56042	27165	4036		13	1	035200310716	
TEXAS	GROESBECK	31 31.5	-096 32.8	08	05	21	8 43.2	60 55.4	27074	48689	55710	26761	4105		13	1	035200310717	
TEXAS	GROESBECK	31 31.5	-096 32.0	14	03	21	9 00.8	61 18.2	26610	48611	55418	26281	4169		13	1	035200310718	
TEXAS	GROESBECK	31 31.5	-096 31.9	14	03	21	9 21.4	61 17.9	26623	48625	55436	26269	4328		13	1	035200310719	
TEXAS	GROVETON	31 03.3	-095 07.5	11	08	15	8 00.6	60 41.6	26944	48001	55046	26681	3754		10	1	035200310720	
TEXAS	GUADALUPE	31 18.9	-103 53.3	02	01	26	10 57.2	59 33.6	27854	47400	54978	27347	5293		87	1	035200310721	
TEXAS	GUTHRIE	33 37.1	-100 18.4	01	09	26	10 45.6	62 24.9	26071	49901	56301	25613	4867		62	1	035200310722	
TEXAS	HORNEY	28 06.0	-096 50.0	38	07	18	9 11.4								0	1	035200310723	
TEXAS	HEREFORD	34 51.3	-102 19.4	61	11	25	11 48.3	63 27.4	24051	48148	53821	23542	4920		118	9	035200310724	
TEXAS	HOUSTON	29 47.1	-095 20.7	02	07	22	7 45.8	59 10.6	28267	47375	55167	28008	3818		2	1	035200310725	
TEXAS	HOUSTON	29 43.3	-095 23.4	24	04	25	8 38.8	60 24.6	26727	47067	54126	26423	4018		2	1	035200310726	
TEXAS	HOUSTON CHAN R	29 40.8	-094 58.8	37	11	12	8 38.4								1		035200310727	
TEXAS	HOUSTON CHAN R	29 45.4	-095 04.0	37	12	02	8 44.3								2	1	035200310728	
TEXAS	HOUSTON	29 37.2	-095 18.3	43	03	08	8 00.2								2	1	035200310729	
TEXAS	HUGHES	30 00.0	-095 06.4	33	03	23	8 31.2								2	1	035200310730	
TEXAS	HUGHES	29 16.0	-095 06.4	37	06	20	8 38.5	59 53.5	26298	45352	52425	25999	3951		2	1	035200310731	
TEXAS	HUGHES	29 15.9	-095 06.4	37	08	18	8 42.0								2	1	035200310732	
TEXAS	HUGHES	29 15.9	-095 06.4	37	11	08	8 41.0								2	1	035200310733	
TEXAS	HUGHES	29 15.9	-095 06.4	37	12	07	8 43.5								2	1	035200310734	
TEXAS	HUGHES	29 15.7	-095 06.2	38	11	23	8 46.2								2	1	035200310735	
TEXAS	HUNTSVILLE	30 43.3	-095 34.0	12	08	26	8 16.7	60 29.9	26979	47682	54785	26698	3884		7	1	035200310736	
TEXAS	HALLETTSVILLE	29 27.4	-096 56.5	01	09	15	8 26.9	58 13.3	28565	46110	54241	28255	4197		6	1	035200310737	
TEXAS	HAMILTON	31 42.0	-098 07.8	12	07	11	9 13.0	60 54.8	26912	48377	55359	26565	4310		41	1	035200310738	
TEXAS	HANSFORD	36 12.0	-101 18.7	02	09	16	11 10.1	64 48.6	24795	52716	58256	24325	4803		98	1	035200310739	

The Secular Change File is a special selection from the file of Magnetic Field Survey Data. It includes all observatory annual means and known repeat observations, both before and after 1900, and is the principal source of data for tracking the long-period changes in the direction and intensity of Earth's magnetic field (fig. 8). A small amount of pre-1900 declination (only) data is also available on a separate magnetic tape.

Other data from Earth surface observations are magnetograms (normal, storm, and rapid-run); hourly values; 2.5-minute, 1-minute, and 10-second values; and various derived indices for individual observatories (e.g., K, A, C, Q) and for global networks (e.g., Kp, AE, Dst). These data (including magnetograms) are held in the form of microfilm, magnetic tapes, yearbooks, and bulletins, depending on the kind of data. Many magnetograms have been digitized, and several have been reduced to common scale. Inquiry about these holdings is invited.

NGDC also maintains as separate data files on magnetic tape the International Repeat Station Data (Item No. TGO-0080) and the Annual Means File (Item No. TGO-0090). Further, NGDC maintains a file of the descriptions of U.S. magnetic stations--i.e., marked points where observations have been made of one or more magnetic elements and where magnetic compasses or other instruments may be calibrated for instrument corrections. Another file is Local Magnetic Disturbances--reports from surveyors and navigators on local

magnetic disturbances that may affect the use of a compass. These reports refer to declination (D) only.

The geomagnetic latitude and longitude (dipole) for specified points and the conjugate point for a specified location can be provided.

The NGDC marine data base provides global coverage of Earth's ocean areas and contains 5.1 million nautical miles of magnetic data. Most of the data are in machine-readable format; other formats include copies of analog records and information on 35-mm microfilm. The data base can be searched for any geographic coordinates.

Airborne (Aeromagnetic Survey) Data

This file contains the results of magnetic observations made from aircraft at worldwide locations since 1953. These data are available as digital records on magnetic tape or as profiles on microfilm. Table 5 summarizes the data now available.

NGDC is now assimilating 400 magnetic tapes (not included in table 5) that contain aeromagnetic data collected by the USGS. The data, which include information for 1971-81 and consist of about 28 million observations, have flight-line spacing between 1/8 mile and 4 miles. Data were collected from 30 States, and offshore the coasts of California, North Carolina, Gulf of Maine, Michigan Peninsula, and the East coast.

Table 5. Aeromagnetic survey data files

[Avg. alt. = average altitude; dist. = distance; D = declination; I = dip; H = horizontal intensity; V = vertical intensity; F = total field intensity; X = north component; Y = east component; s = second; leaders (--) = unknown, nT = nanoTesla (1 nT = 1 gamma)]

Program and item. no.	Area covered and date	Approx. no. of records	Elements	Avg. alt. above sea level	Approx. flight line spacing	Observations		Sensitivity
						Time	Dist.	
				(km)		(km)	(nT)	
<u>Low-Density Surveys¹:</u>								
Project Magnet, TGO-0140.	World (mostly ocean areas, 1953-70).	97,700	D,I,F	2 - 7	<400	5-min avg.	30	1
Canadian, TGO-0100.	Canada (1953-76)	22,000	D,H,Z	3	100	5-min avg.	30	1
<u>High-Density Surveys²:</u>								
Canadian-Scandinavian, TGO-0110.	Nordic countries and Iceland, Greenland Sea (1965).	20,888	D,H,Z,F	3	37	0.5-min avg.	3.5	1
				5	185	0.5-min avg.	3.5	1
	British Columbia Pacific Ocean (1969).	21,207	D,H,Z,F	5	37	0.5-min avg.	3.5	1
				5	74	0.5-min avg.	3.5	1
	Canadian Arctic (1970).	20,882	D,H,Z,F	5	37	0.5-min avg.	3.5	1
	Western Canada (1972).	22,136	D,H,Z,F	3.5	37	0.5-min avg.	3.5	1
	Central Canada (1974).	16,295	D,H,Z,F	3.5	37	0.5-min avg.	3.5	1
	Eastern Canada (1976).	17,458	D,H,Z,F	4.5	74	0.5-min avg.	3.5	1
Woods Hole, TGO-0120.	Greenland Sea (1973).	77,540	F	---	---	0.1 min	---	-----
Oregon State, TGO-0050.	Central Cascades and Vale-Owyhee. (1977).	80,500	F	3	---	1 s	---	1
	California Cascades (1980).	209,332	F	3-4.6	---	-----	---	1
	S. Oregon Cascades (1980).	96,232	F	3	---	-----	---	1
McDermitt Calderas, TGO-0180.	N. Nevada and SE. Oregon (1980).	71,400	F	0.12 (above ground).	0.5	1 s	0.4	0.1
Project Magnet, TGO-0020.	Conterminous U.S. (1976-77).	650,500	F (scalar)	0.5-1.6 (above ground).	100 E-W 400 N-S	1 s	0.1	1
Antarctic-Greenland, GLA-A.	Antarctic-Greenland (1977-79).	-----	X,Y,Z,F	---	---	-----	---	100 (X,Y,Z) 1 (F).
Atlantic continental margin, TGO-0150.	Atlantic continental margin (1974-76).	2,000,000	F (scalar)	0.45	2.5 (near shore); <32.5 (deep water).	1 s	---	0.1
NPRA, TGO-0010.	North slope of Alaska (1977).	45,000	F	0.24	---	1 s	---	-----

¹Used mainly for magnetic modeling and charting.

²Used for magnetic anomaly mapping, mineral and petroleum exploration, and other geological studies.

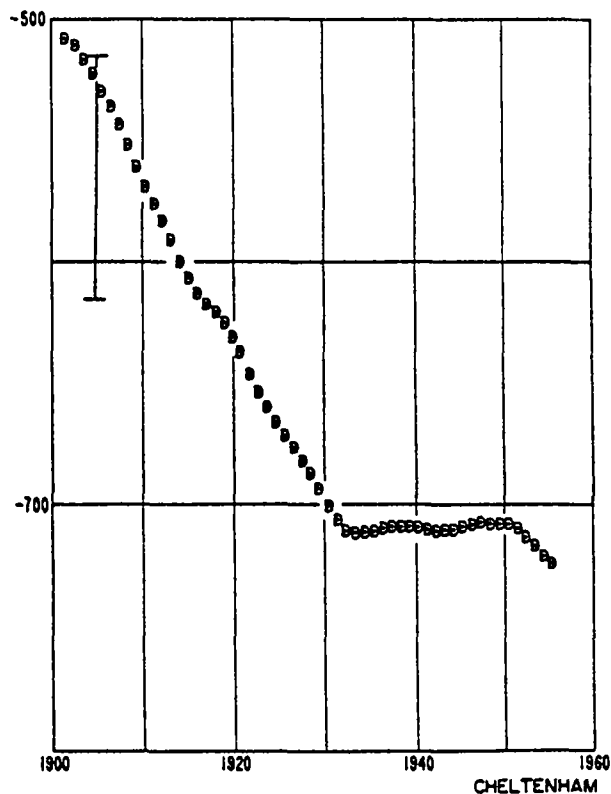
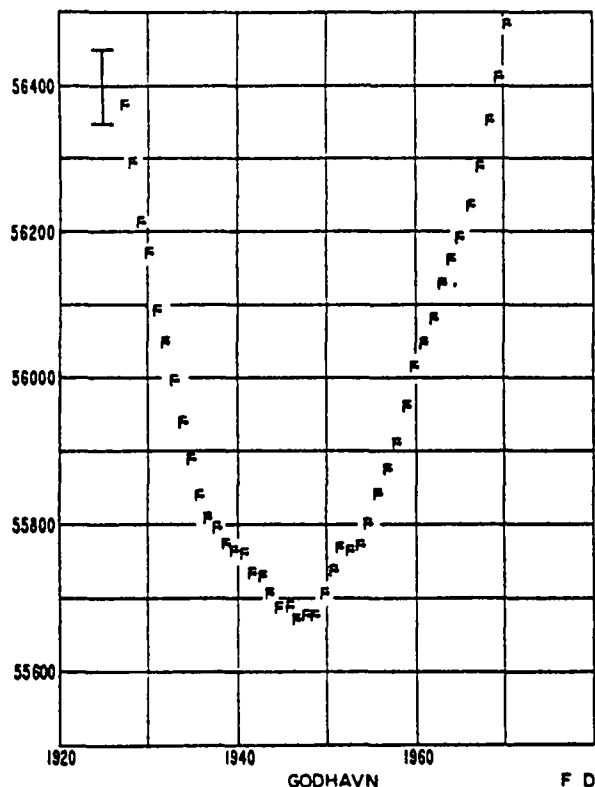


Figure 8. Typical plots of observatory annual means (declination (D) at Cheltenham and total intensity (F) at Godhavn)

Satellite Magnetic Survey Data

More than 17 million selected magnetic observations from several orbiting low-altitude satellites are contained in this file (see table 6). Except for MAGSAT, all the observations are of total intensity (F) only. The MAGSAT data contain both scalar and vector (X, Y, Z) values. For magnetic data from other orbiting satellites, write to World Data Center A for Rockets and Satellites, Goddard Space Flight Center, Code 601, Greenbelt, MD 20771.

Table 6. Satellite magnetic survey data

Satellite	No. of records and Item No.	Interval of operation	Output timing
Vanguard--	3,000; TGO-130.	09/18/59-12/11/59	Irregular
Alouette--	182	11/15/62	Irregular
Cosmos-49-	17,000; TGO-130.	10/24/64-11/06/64	32.8 s
OGO-2-----	48,000†; TGO-130	10/14/65-10/02/67	0.5 min.
OGO-4-----	TGO-130†	07/28/67-01/19/69	0.5 min.
OGO-6-----	TGO-130†	06/05/69-08/29/70	0.6 min. (approx.)
MAGSAT----	17 million; TGO-0060	10/30/79-06/11/80	5 s

†Total of 48,000 records for OGO-2, OGO-4, and OGO-6.

Mathematical Models of Magnetic Field

Mathematical models of Earth's magnetic field are often used in place of observed data for many applications in geophysics or space science. The main magnetic field, as well as the way it varies, is not well known even though it has been measured using many techniques at fixed observatories; on ships, aircraft, and satellites; and on land by surveyors. The main magnetic field, which is due to sources deep within Earth, is distorted by induced fields caused by solar activity and by regional anomalies owing to geologic structure. Also, observations are unevenly distributed around Earth and many are of poor quality.

The models now available from NGDC are shown in table 7; also included are names of authors, time span of applicability, and altitudes of application. All are spherical harmonic models except the last, USD80, which is the current polynomial model for the conterminous United States and Alaska. Request Flier No. 81-TGB-18 for further information.

Some of the special data products that can be provided using the models are:

- Computed values of the magnetic field and its annual change for a specific point;
- Grid values of the magnetic field and its annual change for any geographic area;
- 5° grid values of the magnetic field (grid values can be developed for any grid spacing for some of the models);
- Grid values and charts for the IGRF 1980.0;

- Fortran program decks of spherical harmonic models; and
- Table of secular change in declination for a specified location (of considerable value for surveyors reworking old boundary lines); data availability as given above (see table 8).

Table 8 (cont.)

<u>YEAR</u>	<u>DECLINATION</u>
	° ' "
1905	05 12
1910	05 34
1915	05 56
1920	06 10
1925	06 31
1930	06 49
1935	07 01
1940	06 59
1945	07 00
1950	06 57
1955	07 03
1960	07 13
1965	07 29
1970	07 48
1975	08 16
1980	08 51
1983	09 13

Mathematical models of Earth's magnetic field are used to develop magnetic charts. These are usually prepared by USGS or DMA in collaboration with NOAA. The magnetic charts, or the models from which they are derived, can be used for determining many kinds of data. The charts are commonly used for current values, the models for historical values.

Table 7. Available geomagnetic field models

<u>Model name</u>	<u>Author</u>	<u>Time span</u>	<u>Altitude limits</u>
			(km)
WC80-----	Barker, F.S. Barraclough, D.R.	1975.0-1985.0	0 to 100
U061380--	Cain, J.C.	1957.0-1980.0	0 to 1,500
MGST(680)	Langel, R.A.	1979.85 only	350 to 600
GSFC1266-	Cain, J.C.	1900.0-1966.0	0 to 1,500
IGRF80 } DGRF65 } DGRF70 } DGRF75 } PGRF75 }	IAGA Working Group I-1, Peddie, N.W., Chairman.	1980.0-1985.0 1965.0 1970.0 1975.0 1975.0-1980.0	Sea level Sea level Sea level Sea level Sea level
USD80-----	Fabiano, E.B. Peddie, N.W.	1975.0-1985.0	0 to 10

NOTE: The values of declination are given in units of degrees and minutes of arc. Declination is shown to the nearest minute to illustrate secular change properly. Values for intervening years (e.g., 1751-59, 1761-69) can be found by interpolation.

This table of magnetic declination supercedes previous tables prepared for the Washington, D.C., area prior to April 1, 1980. Values of declination from 1972.5 were obtained using USGS Map I-1283, "Magnetic Declination in the United States, Epoch 1980.0." Values of declination from 1967.5 through 1972.5 were obtained using USGS Map I-911, "Magnetic Declination in the United States, Epoch 1975.0." A value scaled from a chart should be taken as the mean for that location. The value is generally accurate within 1/2°, but the presence of natural or artificial disturbances could cause differences of several degrees. Values from 1955.0 through 1967.5 were derived using unpublished data; values prior to 1955.0 were derived using the source data of Table 4 in "Publication 40.2, United States Magnetic Tables for 1960.0," U.S. Coast and Geodetic Survey, Washington, D.C.

Table 8. Estimated values of magnetic declination in the area of Washington, D.C. (1750-1983)

<u>YEAR</u>	<u>DECLINATION</u>
	° ' "
1750	02 21 WEST
1760	01 42
1770	01 07
1780	00 39
1790	00 20
1800	00 11
1810	00 11
1820	00 21
1830	00 41
1840	01 10
1850	01 44
1860	02 21
1870	03 01
1880	03 41
1890	04 16
1900	04 53

This table was prepared by Solid Earth Geophysics Division, NGDC, NESDIS, NOAA. Coordinates used for Washington, D.C., are N38°53', W77°01'.

Geothermal Data

Volcanoes

A multicolored map showing the location of 1,117 volcanoes, which are known or are believed to have erupted in the last 12,000 years, was published by NGDC for the International Association of Volcanology and Chemistry of the Earth's Interior. The names of about 700 volcanoes and dates of eruptions are shown on the map, and colored symbols indicate frequency of eruption and date of last eruption. Epicenters are also shown for earthquakes of magnitude >5.5 for 1963-77. The map is on a standard Mercator projection at a scale of about 1:30,000,000 (see fig. 9).

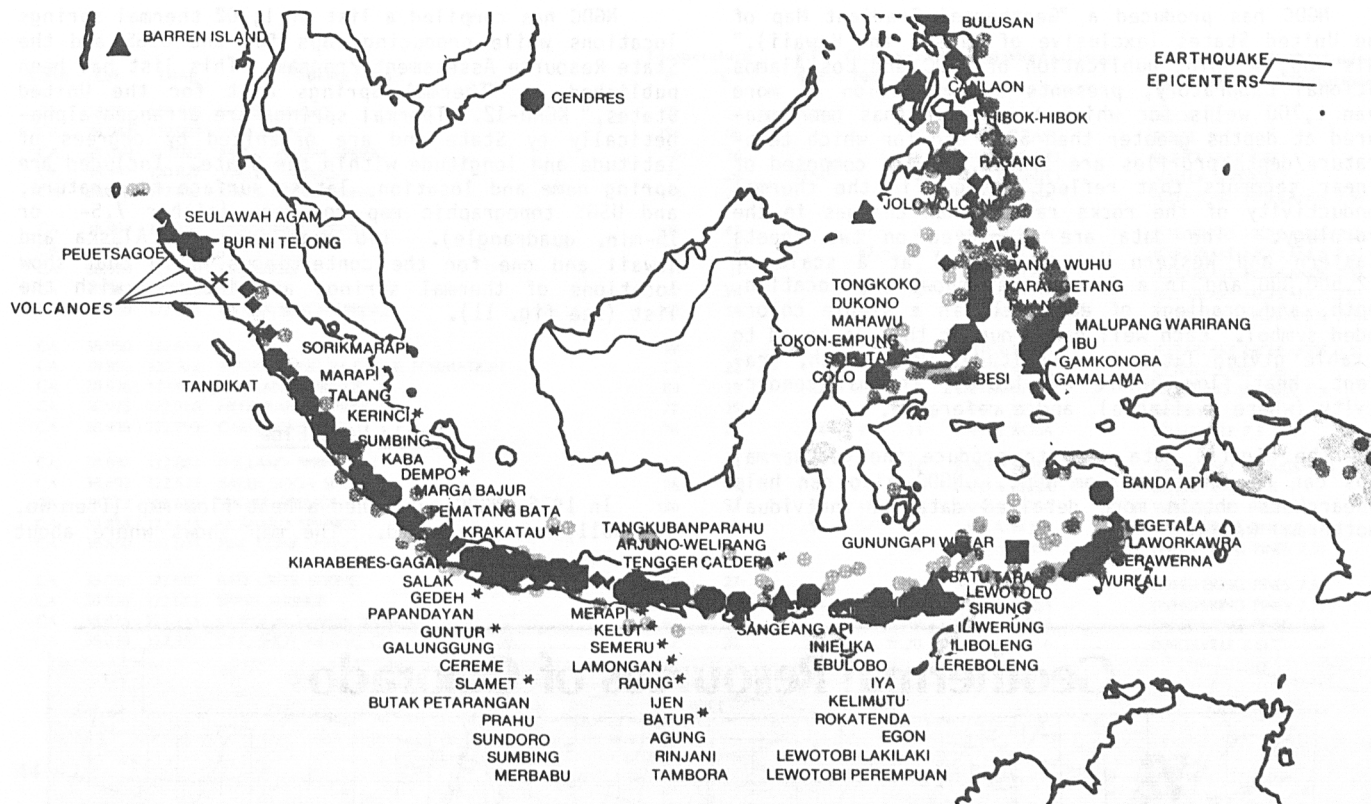


Figure 9. Reduced-scale section from map of "Volcanoes of the World."

Compiled jointly by NGDC and the Smithsonian Institution, it is a companion map to "Volcanoes of the World: A Regional Directory Gazetteer and Chronology of Volcanism During the Last 12,000 Years," by Tom Simkin and others, Smithsonian Institution, Washington, D.C., Academic Press, 1981.

The data used in developing the map (Item No. TGV-0010) are available in digital form on magnetic tape or on punched cards or computer printout. The volcano data record includes name, country, and geographic position.

NGDC also maintains a collection of about 250 photographs that show erupting volcanoes and volcanic edifices. A descriptive list may be requested.

NGDC holds on microfiche the "Bulletin of Volcanic Eruptions," volumes 1-19, published by the Volcanological Society of Japan. New volumes are added as they become available.

Geothermal Energy

NGDC, in cooperation with the U.S. Department of Energy/Division of Geothermal Energy and with many State agencies, has produced many products for the geothermal community. Included are State geothermal energy resource maps for most Western States, four regional maps (2 for Western U.S., 1977 and 1979; 1 for Alaska and Hawaii; and 1 for Gulf of Mexico), and a thermal springs list for the United States.

Geothermal energy resource maps have been or will be printed for the following States (see fig. 10):

Alaska*	Kansas	Oklahoma*
Arizona	Montana	Oregon
California	Nebraska	Texas
Colorado	Nevada	Utah**
Hawaii	New Mexico	Washington
Idaho	North Dakota	Wyoming

*Geothermal resources maps for these States will be available by mid-1983.

**Out of print.

The above "public usage" maps are designed to be of use to entrepreneurs, land planners, legislators, and environmentalists, as well as the geothermal community. Included on the maps are locations of thermal springs, thermal wells, areas with high potential for discovery of additional geothermal resources, and several land-status items such as urban areas, national forests, wilderness areas, and other State and Federal reservations.

"Geotechnical" maps of California and New Mexico are now being produced for the earth-science and engineering members of the geothermal community. These maps focus attention upon the geothermal resource and its relation to geological, geophysical, and geochemical parameters.

NGDC has produced a "Geothermal Gradient Map of the United States (exclusive of Alaska and Hawaii)." This map, a joint publication of NGDC and Los Alamos National Laboratory, presents a compilation of more than 1,700 wells for which temperature has been measured at depths greater than 50 m and for which temperature/depth profiles are linear, or are composed of linear segments that reflect changes in the thermal conductivity of the rocks rather than changes in the hydrology. The data are displayed on two sheets (Eastern and Western United States) at a scale of 1:2,500,000 and in a format that shows the location, depth, and gradient of each well in a single color-coded symbol. Each well has a number that is keyed to a table giving latitude, longitude, well depth, gradient, heat flow (where available), thermal conductivity (where available), and a reference.

The digital data used to produce the geothermal maps can be obtained from NGDC. NGDC also can help researchers obtain more detailed data on individual geothermal wells.

NGDC has compiled a list of 1,702 thermal springs locations while producing maps for the USGS and the State Resource Assessment Program. This list has been published as "Thermal Springs List for the United States," KGRD-12. Thermal springs are arranged alphabetically by State and are organized by degrees of latitude and longitude within the State. Included are spring name and location, latest surface temperature, and USGS topographic map coverage (either 7.5- or 15-min. quadrangle). Two maps (one for Alaska and Hawaii and one for the conterminous U.S.) that show locations of thermal springs are included with the list (see fig. 11).

World Heat Flow

In 1976, NGDC published a heat-flow map (Item No. TGW-0011) of the world. The map shows where about

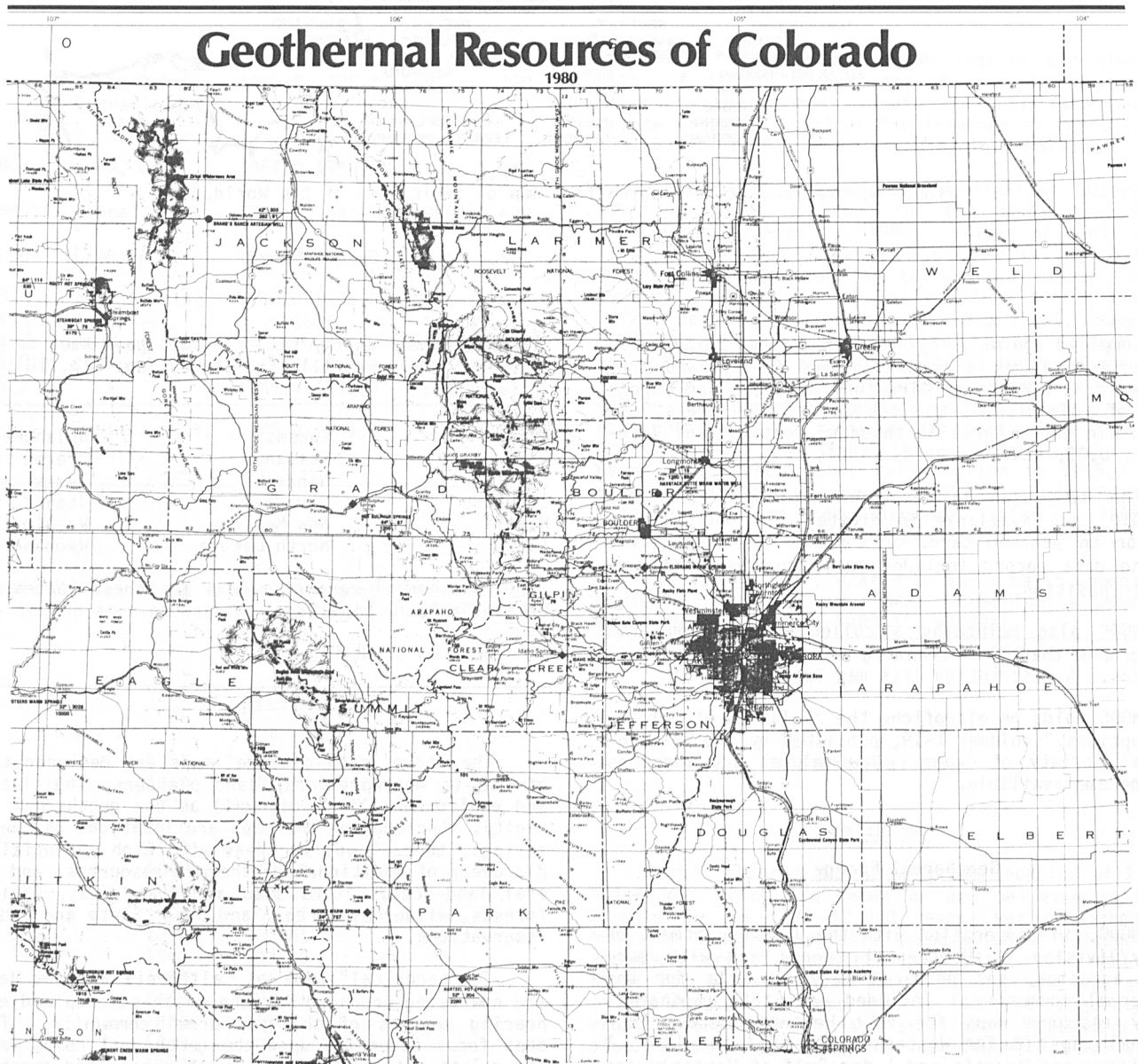


Figure 10. Reduced-scale section from geothermal "public usage" map.

State	Lat.	Long.	Spring Name	Temperature °F °C	P.P. 492	Circ. 790	NOAA 1:250,000(AMS)map	1:63360 or 1:62500 (15-minute) or 1:24000 (7.5-minute) quadrangle
CA	38.203	119.118	WARM SPRING	77 25			8 WALKER LAKE	BODIE 15
CA	38.048	119.081	HOT SPRING	151 66	119		9 WALKER LAKE	BODIE 15
CA	38.850	120.025	MYERS WARM SPRING	75 24			1 SACRAMENTO	(ECHO LAKE 7.5)
CA	38.192	120.827	VALLEY SPRINGS	75 24			2 SACRAMENTO	VALLEY SPRINGS 7.5
CA	38.995	122.642	DAVIS SODA SPRING	73 23	113A		1 SANTA ROSA	(CLEARLAKE HIGHLANDS 7.5)
CA	38.994	122.742	HORSESHOE SPRING	108 42		47	2 SANTA ROSA	(CLEARLAKE HIGHLANDS 7.5)
CA	38.986	122.736		95 35		47	3 SANTA ROSA	(CLEARLAKE HIGHLANDS 7.5)
CA	38.979	122.659	FUMAROLE	H H			4 SANTA ROSA	(CLEARLAKE HIGHLANDS 7.5)
CA	38.963	122.724		W W		47	5 SANTA ROSA	(CLEARLAKE HIGHLANDS 7.5)
CA	38.958	122.701	RIVIERA BEACH SPRING	93 34		47	6 SANTA ROSA	(CLEARLAKE HIGHLANDS 7.5)
CA	38.950	122.654		W W			7 SANTA ROSA	(CLEARLAKE HIGHLANDS 7.5)
CA	38.950	122.572	SODA SPRING IN CACHE FORMATION	72 22			8 SANTA ROSA	(LOWER LAKE 7.5)
CA	38.936	122.907	HIGHLAND SPRINGS	84 29	52		9 SANTA ROSA	HIGHLAND SPRINGS 7.5
CA	38.925	122.770	HILDEBRANDE SPRING	77 25			10 SANTA ROSA	(KELSEYVILLE 7.5)
CA	38.916	122.799	CARLSBAD SPRING	76 24	54	47	11 SANTA ROSA	KELSEYVILLE 7.5
CA	38.897	122.882	ENGLAND SPRINGS	76 24	53		12 SANTA ROSA	(HIGHLAND SPRINGS 7.5)
CA	38.892	122.533	BAKER SODA SPRING	76 24			13 SANTA ROSA	LOWER LAKE 7.5
CA	38.873	122.689	SEIGLER SPRINGS	126 52	59	47	14 SANTA ROSA	WHISPERING PINES 7.5
CA	38.858	122.671	HOWARD SPRINGS	113 45	58	47	15 SANTA ROSA	WHISPERING PINES 7.5
CA	38.850	122.693	PINE CONE SPRING	78 26			16 SANTA ROSA	(WHISPERING PINES 7.5)
CA	38.850	122.667	BAD CREEK SPRING	81 27			17 SANTA ROSA	(WHISPERING PINES 7.5)
CA	38.838	122.653	SPIERS SPRINGS	79 26	61	47	18 SANTA ROSA	(WHISPERING PINES 7.5)
CA	38.835	122.731	GORDON WARM SPRINGS	97 36			19 SANTA ROSA	(WHISPERING PINES 7.5)
CA	38.833	122.357	ONE SHOT MINING CO	92 22			20 SANTA ROSA	(KNOXVILLE 7.5)

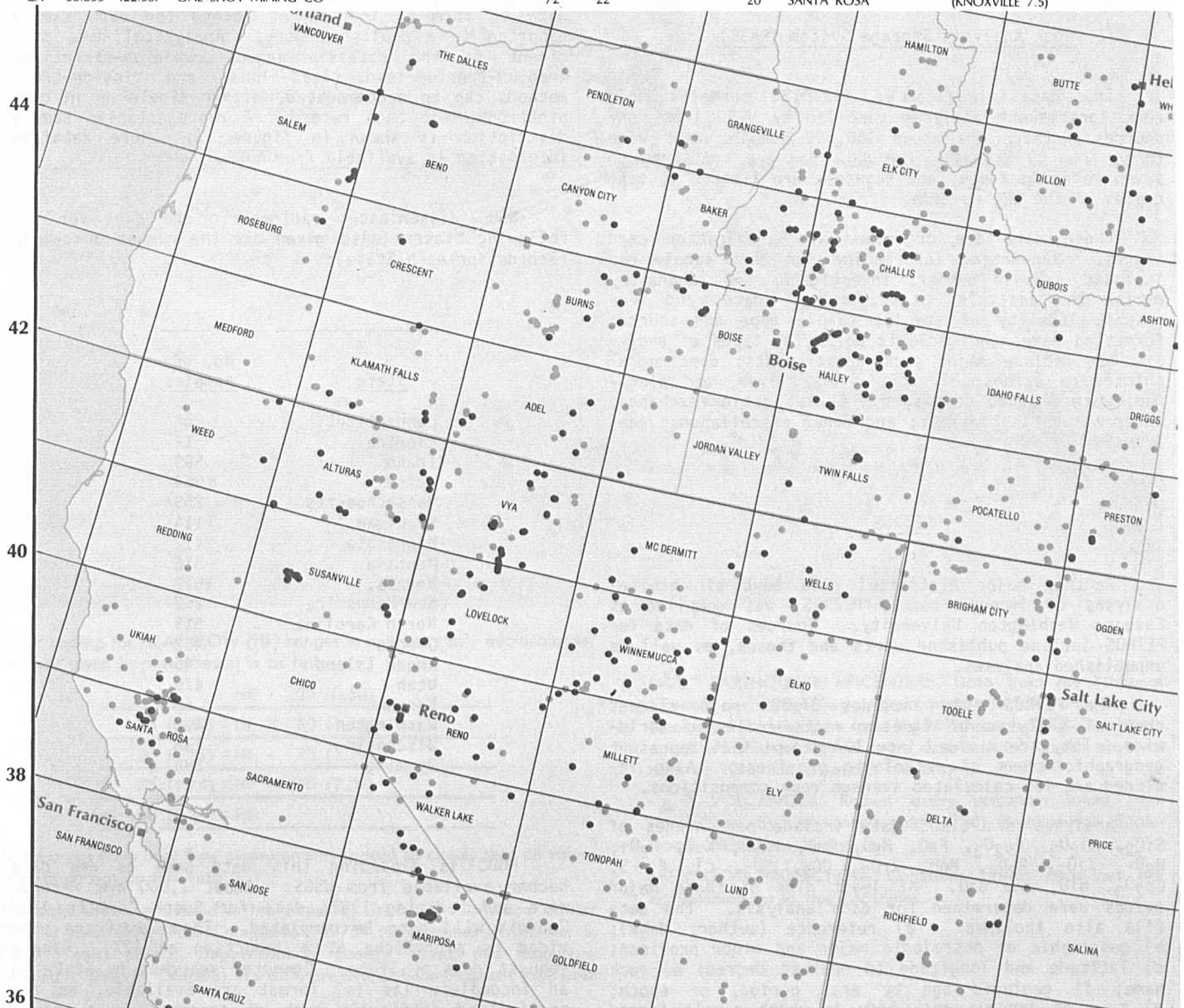


Figure 11. Sample sections from "Thermal Springs List for the United States" and from index map showing locations of springs.

5,500 heat-flow measurements have been made and the approximate value of heat flow at each site. Colors depict different ranges of heat-flow measurements. The map also shows the locations of all known active volcanoes and the earthquake epicenters for 1961-73. These seismically active areas delineate regions on Earth where the lithospheric plates are interacting. Figure 12 is a portion of the heat-flow map.

The heat-flow data shown on the map are also available in digital format on magnetic tape (Item No. TGW-0010). The following information is included for each measurement: identification code, latitude and longitude, height of the temperature-measuring elements in relation to sea surface, temperature gradient, thermal conductivity, and heat-flow value. In addition, each heat-flow measurement is referenced to the publication where the measurement was first reported.

Geochemical Data

Rock Analysis Storage System (RASS)

This data file (Item No. TGZ-0130) contains whole rock constituent analyses compiled by USGS from many sources. There are about 150,000 samples that were taken from 50 States. The data now are contained on seven magnetic tapes, and requests are limited to tape copies of the entire file.

These data are organized in 80-character card images. Supporting information for each sample may include: sample number; investigator and laboratory making the analysis; State, county, date, and geographic locality of sample; sample type and source; formation name; and geologic age. The types of analysis may include major rock constituents; spectrographic; rare earths; element; gold, silver, and platinum; water; ashed sample; oil shale; cation exchange; water saturation extract; and other miscellaneous analyses.

PETROS

Another major historical data bank of chemical analyses of igneous rocks, PETROS, was compiled at Eastern Washington University. Sources of data for PETROS include published works and theses, as well as unpublished analyses.

The PETROS file includes 37,300 major-element chemical analyses of igneous rocks collected worldwide. They are divided into 307 groups that represent geographic areas of petrologic provinces. Also included are 486 calculated average rock compositions.

Analyses of PETROS data include percentages of SiO_2 , Al_2O_3 , Fe_2O_3 , FeO , MgO , CaO , Na_2O , K_2O , H_2O^+ , H_2O^- , TiO_2 , P_2O_5 , MnO , ZrO_2 , CO_2 , SO_3 , Cl , F , S , Cr_2O_3 , NiO , and BaO . At least nine of these major oxides were determined for each analysis. The data file also includes: a) reference (author, date); b) geographic or petrologic major and minor province; c) latitude and longitude to nearest degree; e) rock name; f) geologic age by era, period, or epoch; g) type of igneous rock body in which sample formed (i.e., flow, pyroclastic, plutonic altered); h)

author's analysis number; i) analytical information; and j) sample number within PETROS.

PETROS is available on coded magnetic tape at any compatible density and blocking factor. Unless otherwise specified, the data base will be sent on 9-track, 1600-BPI tape blocked to 4,000 characters.

Documentation file MARTHA appears on the magnetic tape in text form after the PETROS data. A listing of PETROS format information from file MARTHA also is included.

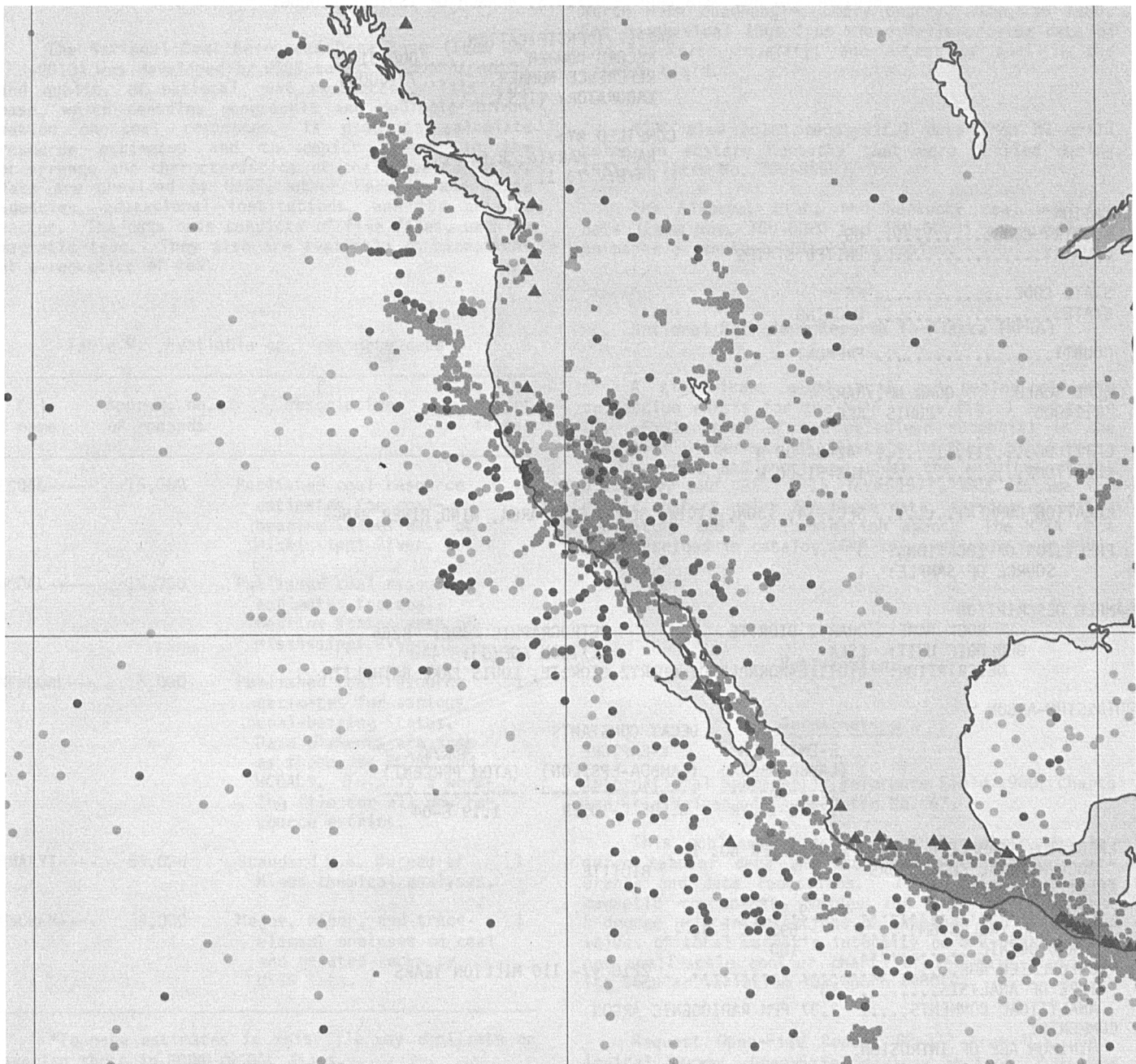
Radiometric Age Data Bank (RADB)

This data bank (Item No. TGZ-0070) is a computerized file established by USGS for collecting and organizing the estimated 100,000 radiometric ages now published for the United States. RADB is constructed to link a complete sample description (locality, rock type), literature citation, and extensive analytical data to form an independent record for each sample reported in a published work. Analytical data pertinent to the potassium-argon, rubidium-strontium, uranium-thorium-lead, lead-alpha, and fission-track methods can be accommodated, either singly or in combinations, for each record. A representative sample description is shown in figure 13. More detailed information is available from NGDC.

NGDC disseminates radiometric age data for the following States (also given are the number of sample records for each State):

<u>State</u>	<u>No. of samples</u>
Connecticut	254
Florida	17
Idaho	599
Maine	364
Massachusetts	259
Michigan	114
Minnesota	412
Montana	816
Nevada	1572
New Hampshire	262
North Carolina	515
Oregon	462
Rhode Island	46
Utah	475
Vermont	65
Washington	458
Wisconsin	138
Wyoming	588

NGDC is expanding this data base as new data become available from USGS. About 1,000 new records were added during 1982; data for South Carolina and Georgia will soon be completed. These data are provided on microfiche at a reduction of 42X. Please request data by State. Computer searches by State in an incomplete (as is) format are available, as are specialized retrievals such as searches on a unique characteristic.



Color coding for HEAT FLOW (HF) ranges in milliwatts/m² (microcalories/cm² -sec given in parentheses) is as follows:

HF - 25 (0.60)
25 (0.60) = HF - 50 (1.19)
50 (1.19) = HF - 75 (1.79)
● 75 (1.79) = HF - 100 (2.39)
● 100 (2.39) = HF

Some areas have heat flow measurements spaced so closely that all values are not shown on this map.

The data shown are listed in the paper by Jessop, Hobart, and Sclater "World Heat Flow Data Compilation-1975" (Geothermal Series No. 5, Earth Physics Branch, Department of Energy, Mines, and Resources, Ottawa 3, Ontario, Canada). The data are available on magnetic tape from WDC-A.

■ EARTHQUAKE EPICENTERS. Data from the National Oceanic and Atmospheric Administration (U.S.A.) and the U.S. Geological Survey. Time span is 1961 through 1973. Only those epicenters whose locations were determined from the observations of 10 or more stations are shown.

▲ VOLCANOES. Known active volcanoes taken from "Volcanoes" by G.A. Macdonald (1972), Prentice-Hall, Englewood Cliffs, New Jersey.

MERCATOR PROJECTION. Computer drawn coastlines are approximations to true coastlines.

Figure 12. Section from "Heat-Flow Map," showing how different data are represented.

RADIOMETRIC AGE DATA BANK - U.S.G.S. BRANCH OF ISOTOPE GEOLOGY

SAMPLE IDENTIFICATION

RECORD NUMBER..... 0001310
 REFERENCE NUMBER..... 73-00008
 LABORATORY (IES)..... SW

COMPILED BY:

NAME: MARVIN, R.F.
 DATE: 76 11

LOCATION

COUNTRY CODE..... US
 COUNTRY..... UNITED STATES

STATE CODE..... 56
 STATE..... WYOMING

COUNTY..... FREMONT

QUAD SCALE QUAD NO./NAME
 1:24000 LOUIS LAKE

LATITUDE..... 42-34-00 N
 LONGITUDE..... 108-51-00 W

LOCATION COMMENT..... SEC. 14, T30N, R101W, SOUTH PASS AREA, WIND RIVER RANGE

PRECISION OF LOCATIONS: 3
 SOURCE OF SAMPLE: 1

SAMPLE DESCRIPTION

ROCK NAME: QUARTZ DIORITE PETROGRAPHIC CODE: B265
 GEOLOGIC UNIT: LSLK LEXICON AGE(S): 440
 DESCRIPTION: BIOTITE-HORNBLLENDE-QUARTZ DIORITE, LOUIS LAKE BATHOLITH

POTASSIUM-ARGON

E-EMISSION (LAMBDA-BETA)	DECAY CONSTANTS		40K/K (ATOM PERCENT)
	K-CAPTURE (LAMBDA-EPSILON)		
4.72 E-10/YR	0.585 E-10/YR		1.19 E-04

LABORATORY SAMPLE NUMBER: WIND RIVER NO. 1
 ROCK/MINERAL CODE: UAS BIOTITE
 ANALYTICAL DATA:
 K20 (%)..... 9.52
 40AR-RAD (MOLES/GM)..... 593 X E-10
 % RADIOGENIC..... 100
 CALCULATED AGE..... 2210 +/- 110 MILLION YEARS
 TYPE OF ANALYSIS..... 10
 ANALYTICAL COMMENTS..... 2.37 PPM RADIOGENIC ARGON

COMMENTS:
 MINIMUM AGE OF INTRUSION

LABORATORY SAMPLE NUMBER: WIND RIVER NO. 1
 ROCK/MINERAL CODE: PC5 HORNBLLENDE
 COMMENT: SOME BIOTITE PRESENT IN HORNBLLENDE CONCENTRATE
 ANALYTICAL DATA:
 K20 (%)..... 0.93
 40AR-RAD (MOLES/GM)..... 79.6 X E-10
 % RADIOGENIC..... 100
 CALCULATED AGE..... 2640 +/- 130 MILLION YEARS
 TYPE OF ANALYSIS..... 10
 ANALYTICAL COMMENTS..... 0.318 PPM RADIOGENIC ARGON

COMMENTS:
 AGE OF INTRUSION

REFERENCE. BAYLEY, R.W., PROCTOR., P.D., AND CONDIE, K.C., 1973, GEOLOGY OF THE SOUTH PASS AREA, FREMONT COUNTY, WYOMING: U. S. GEOLOGICAL SURVEY PROFESSIONAL PAPER 793, P. 28.

Figure 13. Sample of description from Radiometric Age Data Bank (RADB).

Coal Resources

The National Coal Resources Data Base (Item No. TGU-0010) was developed by USGS to assess the quantity and quality of national coal resources. This data base, which contains geographic and geologic information on coal resources, is used to calculate resource estimates and to depict trends in the occurrence and characteristics of coal (see table 9). Data are provided by USGS, other Federal and State agencies, educational institutions, and the private sector. The data base consists of five files, each on magnetic tape. They also are available on microfiche at a reduction of 48X.

Table 9. Available coal resource data

File name	Approx. no. of records	Description	No. of tapes
ECOAL-----	16,000	Published coal resource estimates for coal-bearing States east of Mississippi River.	1
WCOAL-----	16,000	Published coal resource estimates for coal-bearing States west of Mississippi River.	1
NEWCOAL---	3,000	Published coal resource estimates for various coal-bearing States. Data elements are same as those for ECOAL and WCOAL*. This is a working file for all new resource entries.	1
BMALYT----	53,000	Standard U.S. Bureau of Mines chemical analyses.	1
USCHEM----	4,000	Major, minor, and trace-element analyses on coal and related rocks by USGS labs.	1

*Tonnage estimates in this file may duplicate or overlap those in ECOAL/WCOAL files.

Coal well logs (in fields such as those in Alabama) are produced under the USGS national program to delineate tracts of coal and to evaluate coal resources in the public domain. In north-central Alabama, the drilling program was conducted in the Warrior Coal Field beginning in May 1979. Twenty-two well logs from the first phase of drilling and an additional 165 logs from later drilling provide data on thickness, quality, extent correlation, and recoverability of the coal beds; included are gamma-ray, density, spontaneous-potential, and resistivity data. These data are intended to accompany USGS Open-File Report 81-312: "Known Recoverable Coal Resource Area Studies: Geophysical and Lithologic Logs of 1979 Coal Drilling in the Warrior Basin Coal Field, Tuscaloosa, Walker, Fayette, and Marion Counties, Alabama," by Ronald Law and others, USGS, and Catherine A. Horsey, Alabama Geological Survey.

Two wells were drilled in the Wasatch Coal Field, North Horn Quadrangle, Emery County, Utah, in 1980. The geophysical logs from these wells provide data on the thickness, quality, and extent of coal in the Wasatch Field.

NGDC also holds geophysical data from 20 drill holes in eastern Kentucky that were drilled during 1981-82 (Item No. TGU-0050).

The Alabama, Utah, and Kentucky coal well-log data (Item Nos. TGU-0020 and TGU-0050) are available on paper as sepia or blackline copies.

National Petroleum Reserve in Alaska (NPRA)

A significant geophysical and geological data collection exists for the NPRA (see fig. 1 and table 1). Exploration of the petroleum potential in the primitive wilderness of Alaska's Northern Slope began in the 1900s and continued under the auspices of the U.S. Navy and USGS. In late 1977, NGDC became the public contact point for these data, serving as both a depository and a dissemination agent. The NPRA data are described in catalog KGRD-16, available from NGDC.

Publications

Geomagnetism

International Geomagnetic Reference Field 1980: Charts and Grid Values, IAGA Bulletin No. 47.

This publication is designed for those who require tabular data and small-scale charts for reference and data reductions. It contains for seven magnetic components, values for each point at the 5-degree grid intersections of latitude and longitude; values of total magnetic intensity on a 2-degree grid; and small-scale contour charts of the main field and its secular variation for epoch 1980.0.

Request Open-File Report 82-377 from U.S. Geological Survey, Open-File Services Section, P.O. Box 25425, Denver, CO 80225.

Composite Magnetic Anomaly Map of the United States

This is the first map to show magnetics for all of the United States. Part A contains the conterminous United States; Part B, Alaska and Hawaii (scale: 1:2,500,000). Map GP-954A, which is in color, may be obtained from U.S. Geological Survey, Open-File Services Section, P. O. Box 25425, Denver, CO 80225.

Geomagnetic Observatories 1978 (Report SE-21, November 1979, 88 p.)

This publications lists 290 geomagnetic observatories and their facilities. For this designation,

it was generally required that a station have a program that enabled it to provide annual means (preferably three elements)--data which in principle can be used for the study of secular changes. Available from NGDC.

Annual Mean Values of Geomagnetic Components for Selected Observatories, 1940-73 (Report SE-17, June 1979, 82 p.)

Annual mean values obtained at observatories historically have been the most basic data for investigating the geomagnetic secular variation. The geomagnetic secular variation associated with the solar cycle is examined, and the annual mean values of three elements of the geomagnetic field were compiled to give a homogeneous data set for 38 selected observatories.

Request publication PB298716/AS from the National Technical Information Service, 5285 Port Royal Rd., Springfield, VA 22161.

Magnetic Surveys (Serial 718)

This 20-page brochure briefly discusses how magnetic measurements are taken and gives general information about the Earth's magnetism and the practicable uses of magnetic data. It is recommended for the layman, and should be especially useful to land surveyors. Available from NGDC.

Magnetic Poles and the Compass (Serial 726)

Four common misconceptions about the compass and magnetic poles are discussed briefly. Xerographic copy available from NGDC.

Magnetic Charts of the United States

The following charts may be obtained from the U.S. Geological Survey, Branch of Distribution, Central Region, Box 25286, Denver Federal Center, Denver, CO 80225:

Map I-1283, Magnetic Declination in the United States - Epoch 1980.0;

Map I-912, Magnetic Inclination in the United States - Epoch 1975.0;

Map I-913, Magnetic Horizontal Intensity in the United States - Epoch 1975.0;

Map I-914, Magnetic Vertical Intensity in the United States - Epoch 1975.0;

Map I-1370, Magnetic Total Intensity in the United States - Epoch 1980.0.

Magnetic Charts of the World

The following charts may be obtained from Defense Mapping Agency, Topographic Center, ATTN: DDCP, 6500 Brooks Lane, N.W., Washington, DC 20315:

Chart N.O. WOBZC 42, Magnetic Variation, Epoch 1980.0;

Chart N.O. WOBZC 43, Magnetic Variation, (Polar Areas), Epoch 1980.0;

Chart N.O. WOXZC 30, Magnetic Inclination or Dip, Epoch 1975.0;

Chart N.O. WOXZC 33, Magnetic Horizontal Intensity, Epoch 1975.0;

Chart N.O. WOXZC 36, Magnetic Vertical Intensity, Epoch 1975.0;

Chart N.O. WOXZC 39, Magnetic Total Intensity, Epoch 1975.0.

Foreign Magnetic Charts

NGDC has collected several magnetic charts prepared by foreign agencies. A printout listing titles of the collection is available. The cost of black and white copies depends on chart size.

Catalog of Standard Geomagnetic Variation Data

This catalog lists the observatory-intervals for which magnetic observatory data are available. The data consist of magnetograms hourly values, 2.5-min. values, 1-min. values, various types of geomagnetic indices, and tables describing principal magnetic storms. The catalog also gives formats in which the data are available and the costs of furnishing copies.

National Petroleum Reserve in Alaska

Catalog of Geological and Geophysical Data for the National Petroleum Reserve in Alaska (KGRD-16, May 1982, 105 p.)

Summarizes geophysical and geological data available from the Reserve; includes well-log and seismic data. Available from NGDC.

Gravity

U.S. Land Gravity (KGRD-18, 1982, 24 p.)

Briefly describes the operations and gravity data files of the Department of Defense, National Geodetic Survey (NOAA), and NGDC. Appendices describe gravity-station data formats, marine gravity data, and topographic data. Available from NGDC.

Gravity Anomaly Map of the United States (Exclusive of Alaska and Hawaii)

The map depicts contoured gravity values for the conterminous United States (Bouguer anomaly) and the continental shelf (free-air anomaly). The gridded data base, which was constructed by USGS from DMA digital land gravity data, has a value for each 4-km by 4-km interval. Available from the Society of Exploration Geophysicists (P.O. Box 3098, Tulsa, OK 74101).

Geothermics

Thermal Springs List for the United States (KGRD-12, June 1980, 60 p.)

A compilation of thermal spring locations and temperatures with accompanying maps, listing 1,702 thermal spring locations in 23 States. The list is arranged alphabetically by State and geographically by coordinates within the State. Available from NGDC.

Geothermal Resource Maps

NGDC has produced geothermal energy maps for many areas of the United States that show various kinds of geothermal energy resources found in each area. The resource maps are designed for two audiences--the general public and the earth-science community. Two different maps are planned for some areas: a "public usage" map and a geotechnical map.

Geothermal data sets depicted on the "public usage" maps include thermal springs and wells, temperatures, flow rates, total dissolved solids content, depth of wells, areas with a high potential for discovery of additional geothermal resources, gradient ranges, heat-flow values, and Known Geothermal Resources Areas (KGRA's). Public usage maps are:

1. Geothermal Energy in the Western United States;
2. Geothermal Energy in Alaska and Hawaii;
3. Geopressured-Geothermal Energy in Reservoir Fluids of the Northern Gulf of Mexico Basin;
4. Geothermal Energy Resources of the Western U.S.; and
5. Geothermal Resources maps for the States of: Colorado, New Mexico, Idaho, California, Washington, North Dakota, Montana, Arizona, Nebraska, Kansas, Oregon, Texas, Hawaii, Nevada, and Wyoming. Maps for Oklahoma and Alaska are planned for mid-1983.

Geotechnical maps are designed to center attention on the geothermal resource and its relation to geological, geophysical, and geochemical parameters. These maps include:

1. Technical Map of the Geothermal Resources of California;
2. Geothermal Resources of New Mexico: Scientific Map Series, Late Tertiary and Quaternary Tectonics and Volcanism; and
3. Geothermal Gradient Map of the United States.

Seismology

Earthquake Data Services and Publications (including Tsunami), KGRD-15, 1983, 13 p.

Gives brief description of data available from NGDC (including publications) and common formats of the data.

Marine Geology and Geophysics

Marine Geology and Geophysics Data Services and Publications, KGRD-14, 1981, 14 p.

Describes products and services available from NGDC and gives common formats of the data.

List of Data Announcement Fliers

Coal Data

1981 SE-B National Coal Resources Data Base
1981 SE-H Geophysical Logs from Recent Coal Drill Holes

Geochemistry

NPRA Descriptions of geophysical and geological data available from the National Petroleum Reserve in Alaska
82-TGB-97 Radiometric Age Data Bank
81-MEG-12 PETROS

Geothermal Data

82-TGB-14 Geothermal Resource Maps (and data)
82-TGB-16 Geothermal Gradient Data and Map for the United States

Gravity Data

82-TGB-02 Land Gravity Data for the Conterminous United States

Magnetics Data

1980 GL-A Airborne Polar Ice Sounding and Geomagnetic Data Sets
1980 SE-M Aerial Gamma-Ray and Magnetic Survey of the National Petroleum Reserve in Alaska
1980 SE-R Project Magnet: Airborne Magnetic Survey of the United States (1976-77)
1980 SE-GG Magnetic Publications and Services for Surveyors
81-TGB-18 Values of Earth's Magnetic Field from Mathematical Models
82-TGB-04 Aeromagnetic Data
82-TGB-06 U.S. Atlantic Continental Margin Aeromagnetic Survey
82-TGB-13 McDermitt Calderas, Nevada-Oregon Aeromagnetic Survey

Non-NPRA Seismics

1980 SE-C CDP Data in the Northern Mississippi Embayment
1980 SE-S CDP Data in the Appalachian Overthrust
82-TGB-03 Seismic Reflection Data in the Eastern Powder River Basin, Wyoming; Red Bird Prospect

Topography Data

1980 SE-D Bathymetry and Elevations for 1° areas
1980 SE-O Elevation Data for North America
1980 SE-Y Bathymetric and Geodetic Summaries
1980 SE-KK Average Terrain Data for the Conterminous United States

NPRA Data

Seismic data and reports:

1978 Q-Q Seismic Data (1972-77)
1979 (T) Seismic Interpretation--Summary Report (FY-77)
1980 SE-M Seismic Data (1977-78) and Aerial Gamma-Ray and Magnetic Survey
1980 SE-DD Seismic Interpretation--Summary Report (FY-78)
1980 SE-HH Seismic Field Tapes (1972-80)
1980 SE-LL Seismic Data and Summary Geophysical Report (FY-79)
1981 SE-D Seismic Data (FY-80)
81-TGB-19 Summary of Geophysical Data Tapes
81-TGB-27 Grab Bag Set--Reprocessed Seismic Sections
81-TGB-28 Seismic Data Sections and Tapes (FY-81)
82-TGB-01 Inuit (Eskimo) Seismic Data Sections
82-TGB-08 Regional Geophysical Data and Miscellaneous Compressed Sections
NPRA Descriptions of geophysical and geological data available from NPRA

Well logs and reports:

1978 R Well Logs (1955-77)
1979 U Well Logs (1977-78)
1980 SE-J Well Logs (1978-79)
1981 SE-E Well Logs and Auxiliary Data (1979-80)
1980 SE-K Velocity Surveys, 9 Wells (1977-79)
1980 SE-EE Velocity Surveys, 7 Additional Wells
81-TGB-21 Synthetic Seismograms for 29 Wells
81-TGB-22 Well Completion File (and Summary Geologic Report--FY-80)
81-TGB-23 Digitized Logs from 69 Wells
81-TGB-25 Six Well Logs and Auxiliary Data (1981)

Geology data and reports:

1980 SE-J Summary Geologic Report (FY-78)
1980 SE-MM Summary Geologic Report and Data (FY-79)
1980 SE-I Palynology and Micropaleontology Reports 30 Wells (1944-79)
1980 SE-CC Palynology and Micropaleontology Reports (additional)
1980 SE-FF Miscellaneous Geological Reports
81-TGB-22 Summary Geological Report (FY-80) and Well Completion File
81-TGB-20 Three Additional Geologic Reports
81-TGB-26 Five Geologic Reports (1977-79)

Miscellaneous reports:

1980 SE-NN NPRA Gravity Data (1974-80)
1980 SE-L Barrow Area, Geophysical Data and Reports (1976-78)