U.S. DEPARTMENT OF THE INTERIOR
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GEOLOGIC MAP OF THE MONTEREY AND SEASIDE 7.5-MINUTE QUADRANGLES, MONTEREY COUNTY, CALIFORNIA: A DIGITAL DATABASE

By

Joseph C. Clark[1], William R. Dupré[2], and Lewis I. Rosenberg[3]

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[1] Geoscience Department, IUP, Indiana, Pennsylvania 15705
[2] Department of Geosciences, University of Houston, Houston, Texas 77204
[3] Consulting Geologist, Post Office Box 1755, King City, California 93930

DIGITAL DATABASE

Introduction

This Open-File report is a digital geologic map database stored in a computer in the U. S. Geological Survey offices in Menlo Park, California. This pamphlet describes what is in this database and gives instructions for obtaining the data. Unlike a traditional Open File Report, no paper map is available for distribution. The database does include, however, PostScript plot files containing images of two quadrangles on one geologic map sheet and an explanation sheet that can be plotted on paper. Users without a compatible computer system interested in obtaining these paper plots or in obtaining the PostScript plot files, please see the section below entitled "For Those Who Don't Use Digital Geologic Map Databases".

This digital map database updates a previously published map (Clark and others, 1974) and other published and unpublished data (see Sources of Data in mo-se.ps2) with substantial new mapping by the authors. Together with the accompanying text file (mo-se_geo.txt or mo-se_geo.ps), it provides current information on the stratigraphy and structural geology of the area. The database delineates map units that are identified by general age and lithology following the stratigraphic nomenclature of the U.S. Geological Survey. More specific information about the units may be available in previous publications. The scale of the source maps limits the spatial resolution (scale) of the database to 1:24,000 or smaller. The content and character of the database, as well as three methods of obtaining the database, are described below.

For Those Who Don't Use Digital Geologic Map Databases

For those interested in the geology of the Monterey and Seaside quadrangles who do not use an ARC/INFO-compatible Geographic Information System (GIS), two PostScript plot files containing images of much of the data in the digital database have been included in the database (please see the section "PostScript Plot Files" below). Those interested who have computer capability can access the PostScript plot files in any of the three ways described below to access the digital data (please see the section "Obtaining the Digital Data"), including the Western Region Web Page (please see the section "Web Pages"). For those without computer capability, we have made the plot files available to outside vendors, or we can provide users with the PostScript plot files on digital tape that can be used by other vendors (please see the section "Obtaining Plots from an Outside Vendor").

Database Contents

The digital database consists of the geologic map database itself and the supporting data, including base maps, geologic description, and references. The digital maps, or coverages, along with their associated INFO directory have been converted to ARC/INFO export files. ARC export files promote ease of data handling, and are usable by some Geographic Information Systems in addition to ARC/INFO (see below for a discussion of working with export files). The ARC export files and the associated ARC/INFO coverages and directories, as well as the additional digital material included in the database, are described below:

The geologic map database consists of the following ARC coverages, which have been converted to uncompressed ARC/INFO export files:

Monterey 7.5-minute quadrangle:

ARC/INFO export file	Resultant Coverage After Import	Description of coverage
mobase_utm.e00	mobase_utm/	Vectorized topographic base map for the Monterey quadrangle.
mo_geol.e00	mo_geol/	Geologic map.
mo_strc.e00	mo_strc/	Strike and dip symbols and fold arrow markers.
mo_anno.e00	mo_anno/	Fault names, U/D, locality numbers, and dip numbers.
mo_fold.e00	mo_fold/	Fold axes.
mo_arws.e00	mo_arws/	Landslide arrows.

Seaside 7.5-minute quadrangle:

ARC/INFO Export file	Resultant Coverage After Import	Description of coverage
sebase_utm.e00	sebase__utm/	Vectorized topographic base map for the Seaside quadrangle.
se_geol.e00	se_geol/	Geologic map.
se_strc.e00	se_strc/	Strike and dip symbols and fold arrow markers.
se_anno.e00	se_anno/	Fault names, U/D, locality numbers, and dip numbers.
se_fold.e00	se_fold/	Fold axes.
se_arws.e00	se_arws/	Landslide arrows.

The database directory also includes the following supporting directory and files:

Directory:

Resultant Coverage After Import	
info/	INFO directory containing files supporting the databases. This directory is not included in the database release, but is created in the process of converting the export files into ARC coverages.

Files:

mo-se_geo.txt	A text only computer file containing detailed unit descriptions and geological information, plus sources of data and references cited.
mo-se_geo.ps	A postscript version of the mo-se_geo.txt file.
mo-se_db.txt	This file.
mo-se_db.ps	A postscript version of the mo-se_db.txt file.

The postscipt plot file contains the following files:

mo-se.ps	A postscript plottable file containing an image of the Monterey and Seaside geologic map (sheet 1) on a gray line base map.
mo-se.ps2	A postscript computer file containing detailed unit descriptions and geological information, plus sources of data and references cited (sheet 2).
mo-se_geo.ps	The postscript version of the mo-se_geo.txt file.

Database Release Format

The database was compiled in ARC/INFO, a commercial Geographic Information System (Environmental Systems Research Institute, Redlands, California), and is stored in uncompressed ARC export format (ARC/INFO version 7) in a compressed UNIX tar (tape archive) file. Tar and uncompress utilities are therefore required to extract the database from the tar file. These utilities are included in most UNIX systems, and can be obtained free of charge via the Internet from Internet Literacy's Common Internet File Formats Web page (http://www.matisse.net/files/formats.html). ARC/INFO export files (files with the .e00 extension) can be converted into ARC/INFO coverages (see below) and can be read by some other Geographic Information Systems, such as MapInfo via ArcLink. The digital compilation was done using version 7.0.3 of ARC/INFO with version 3.0 of the menu interface ALACARTE (Fitzgibbon and Wentworth, 1991; Fitzgibbon, 1991; and Wentworth and Fitzgibbon, 1991).

Obtaining the Digital Data

The digital data can be obtained in any of three ways:

a. Sending a tape with request
b. Anonymous ftp over the Internet
c. From the Western Region Geologic Information Web Page

A 68 MB compressed tar file of the database and related files can be obtained by anonymous ftp over Internet, or by sending a tape with request and return address to:

Monterey-Seaside Geology PostScript Plotfiles
c/o Database Coordinator
U.S. Geological Survey
345 Middlefield Road, M/S 975
Menlo Park, CA 94025

Do not omit any part of this address!

The compressed tar file will be returned on the tape. The acceptable tape types are:
1/4 inch, 150 MB cartridge tape
2.3 or 5.0 GB, 8 mm Exabyte tape.

To obtain the tar file by ftp, log in to your UNIX system and do the following:

cd local_directory	• go to a directory to receive the tar file
ftp wrgis.wr.usgs.gov	• make ftp connection with the USGS computer WRGIS
Name: anonymous	• use “anonymous” as your user name
Password: your name	• use your own user name as password
cd pub/geologic	• go down to the pub/geologic directory
cd ca/of97-30	• go down to the open file directory
type binary	• change transfer type to binary
get mo-se_g1.tar.Z	• copy the compressed tar file across Internet to your directory
quit	• close the ftp connection

Web Pages

The U.S. Geological Survey now supports a set of graphical pages on the World Wide Web. Digital publications (including this one) can be accessed via these pages. The location of the main web page for the entire U.S. Geological Survey is "http://www.usgs.gov". The web page for digital publications from the Western Region (including this one) is "http://wrgis.wr.usgs.gov". In addition to providing easy access to the entire digital database, the Western Region web page also provides simple access to the PostScript plot files of the map and explanation sheets containing much of the data in the digital database. The Western Region web page also provides simple access to the digital database for those interested in the geology of Monterey-Seaside who do not use digital databases (see below).

Postscript Plot Files

The database is in ARC export format, and therefore requires use of ARC/INFO or another compatible GIS to access the information contained within it. For those interested in the geology of the area, we have included two Postscript plot files. The first contains a plot of the Monterey and Seaside map database at 1:24,000 scale (sheet 1, mo-se.ps). The second contains a plot of the explanation of units, along with a map of the subsurface structure in the Seaside area (sheet 2, mo-se.ps2). Because this map is primarily a digital database, the plot files (and plots derived therefrom) have not been edited to conform with U.S. Geological Survey standards. Small units have not been labeled with leaders and in some instances map features or annotation overlap. Sample plots by the authors have proven to be quite legible and useful, however. These plot files are available, both within the postscript plot file package (mo-seps.tar.Z) and as separate files, in any of the three ways described above, including the world Wide Web pages. However, the plot files are stored in compressed UNIX tar files requiring uncompress and tar utilities to access the files. These utilities are included in most UNIX systems, or can be obtained free of charge via the Internet from Internet Literacy's Common Internet File Formats Web page (http://www.matisse.net/files/formats/html). The PostScript images are 42 inches wide by 38 inches high, so they require a large plotter to produce paper copies at the intended scale. In addition, some plotters, such as those with continual paper feed from a roll, are oriented with the long axis in the vertical direction, so the PostScript image will have to be rotated 90 degrees to fit entirely onto the page. Some plotters and plotter drivers, as well as many graphics software packages, can perform this rotation.

Creation of Sheet 2

Sheet 2 was created by converting separate files created in Deneba Canvas into Adobe Illustrator format, and placing them into a 36" x 48" Adobe Illustrator document layout. The colors used for the Correlation of Map Units and Description of Map Units were matched to the ARC/INFO map colors by converting the ARC/INFO map graphics file into an Adobe Illustrator file. Colors were determined in Adobe Illustrator and duplicated into the Correlation of Map Units and Description of Map Units on Sheet 2.

Obtaining Plots from an Outside Vendor

For those interested in the geology of the Monterey and Seaside quadrangles who do not use computers, we have made the PostScript plot files available to Capitol Color , 2250 Walsh Ave., Santa Clara, phone: 1-800- 700-2656 or 408-727-7560, FAX: 408-727-0737, and to American Blueprint Service, 325 Prescot Lane, Pacific Grove, phone 408-373-5115. They will provide plots of the PostScript images of the geologic map sheet and explanation sheet for a fee (around $25 per sheet, with discounts for orders of multiple copies). We will also provide the PostScript plot files on digital tape for use by other vendors. A 24.5 MB compressed tar file (mo-seps.tar.Z, 87.5 MB when uncompressed) of the PostScript plot files can be obtained by sending a tape with request and return address to:

Monterey-Seaside Geology PostScript Plotfiles
c/o Database Coordinator
U.S. Geological Survey
345 Middlefield Road, M/S 975
Menlo Park, CA 94025

Do not omit any part of this address!

The compressed tar file will be returned on the tape. The acceptable tape types are:
1/4 inch, 150 MB cartridge tape
2.3 or 5.0 GB, 8 mm Exabyte tape.

Make sure your vendor is capable of reading these tape types and PostScript plot files, and is capable of preparing a color plot on 36 inch paper. Important information regarding tape file format is included in the section "PostScript Plot Files" above, so be certain to provide a copy of this document to your vendor.

Extracting the Database from the Tar File

If you obtained the database on tape, put the tape in your tape drive and do the following:

cd local_directory	• go to a directory to receive the tar file
tar xvfb/dev/rstn 20	• /dev/rstn is the tape device with n and integer, this puts the tar file in local_directory
uncompress mo-se_g1.tar.Z	• makes a 231 MB uncompressed tar file mo-se_g1.tar
cd local_directory2	• go to the directory that will hold the workspace mo-se_geo (if different from local_directory)
tar xvfb {path to tar file}/ mo-se_g1.tar 20	• extract the mo-se_geo workspace from the tar file

If you obtained the database by anonymous ftp:

uncompress mo-se_g1.tar.Z	• makes a 231 MB uncompressed tar file mo-se_g1.tar
cd local_directory2	• go to the directory that will hold the workspace mo-se_geo (if different from local_directory)
tar xvfb {path to tar file}/ mo-se_g1.tar 20	• extract the mo-se_geo workspace from the tar file

This process will create a workspace "/mo-se_geo" (a directory containing an INFO directory) that contains the databases and supporting files as described above.

Converting ARC export files

ARC export files are converted to ARC coverages using the ARC command IMPORT with the option COVER for each of the export files (.e00 files). From the ARC command line type:

import cover <export file> <output coverage>	• creates a coverage from an export file. Use output coverage name from the Resultant Coverage list as shown on page 3

ARC export files can also be read by some other Geographic Information Systems. Please consult your GIS documentation to see if you can use ARC export files and the procedure to import them.

Digital Compilation

The geologic map information was digitized from stable originals of the geologic maps at 1:24,000 scale. The author manuscripts (ink on mylar) were scanned using a Tektronix 4991 monochrome scanner with a resolution of 304.8 dots per inch. The scanned images were vectorized and transformed from scanner coordinates to projection coordinates with digital tics place by hand at quadrangle corners. The scanned lines were edited interactively by hand using ALACARTE, color boundaries were tagged as a contact or fault as appropriate, and scanning artifacts visible at 1:24,000 were removed.

Base Maps

Base map layers were prepared from scale-stable printing positives of the U.S. Geological Survey Monterey (1968 edition) and Seaside (1968 edition) 1:24,000 topographic maps, which have a 20-foot contour interval. Scanned images were transformed from scanner coordinates to projection coordinates with digital tics placed by hand at quadrangle corners. The images were trimmed interactively by hand using ALACARTE to conform to the area of the geologic coverages. Small mismatches at the boundaries caused by slight differences in the original maps remain in the two base map coverages. These base map layers are digital images but no information other than location is attached to the pixels. The base maps are provided for reference only.

Faults

This map is intended to be of general use to engineers and land-use planners; however, its small scale does not provide sufficient detail for site development purposes. In addition, this map does not take the place of fault-rupture hazard zones designated by the California State Geologist (Hart, 1992).

Spatial Resolution

Users of this map should recognize the spatial resolution of the data. Although the digital form of the data removes the constraint imposed by the scale of a paper map, the detail and accuracy inherent in map scale are also present in the digital data. The fact that this database was edited at a scale of 1:24,000 means that higher resolution information is not present in the dataset. Plotting at scales larger than 1:24,000 will not yield greater detail, although it may reveal fine-scale irregularities below the intended resolution of the database. Similarly, where this database is used in combination with other data of higher resolution, the resolution of the combined output will be limited by the lower resolution of these data.

Database Specifics

The map databases consist of ARC coverages and supporting INFO files, which are stored in a Universal Transverse Mercator projection (table 1). Digital tics define a 2.5-minute grid of latitude and longitude in the geologic coverages corresponding with quadrangle corners. In the base map layers, the tics define a 2.5-minute grid, corresponding with quadrangle corners.

Table 1 - Map projection.

Parameter	Description
Projection	UTM
Units	Meters on the ground
Zone	10
Datum	NAD27

The content of the geologic database can be described in terms of the lines and the areas that compose the map. Descriptions of the database fields use the terms explained in Table 2.

Table 2 - Field definition terms.

Parameter	Description
Item name	Name of database field (item)
Width	Maximum number of digits or characters stored
Output	Output width
Type	B-binary integer, F-binary floating point number, I-ASCII integer, C-ASCII character string
N. dec.	Number of decimal places maintained for floating point numbers

Lines

The lines (arcs) are recorded as strings of vectors and are described in the arc attribute table (table 3). They define the boundaries of the map units, faults that do not bound units, the boundaries of open bodies of water, and the map boundaries. These distinctions, including the geologic identities of the unit boundaries, are recorded in the LTYPE field according to the line types listed in table 4.

Table 3 - Content of the arc attribute tables.

Item name	Width	Output	Type	N. dec.	Description
FNODE#	4	5	B	- -	Starting node of arc (from node)
TNODE#	4	5	B	- -	Ending node of arc (to node)
LPOLY#	4	5	B	- -	Polygon to the left of arc
RPOLY#	4	5	B	- -	Polygon to the right of arc
LENGTH	4	12	F	3	Length of arc in meters
<coverage>#	4	5	B	- -	Unique internal control number
<coverage>-ID	4	5	B	- -	Unique identification number
LTYPE	35	35	C	- -	Line type (see table 4)

The geologic line types are ALACARTE line types that correlate with the geologic line symbols in the ALACARTE line set GEOL61.LIN according to the ALACARTE lines lookup table (GEOL61.LUT). Note that fault and strike-slip fault, right-lateral are assigned the same symbol in the lookup table.

Table 4 - Line types recorded in the LTYPE field.

Name
Contact, certain
Contact, approximately located
Contact, concealed
Contact, inferred
Contact, inferred, queried
Contact, inner edge of terrace deposit, certain
Fault, certain
Fault, concealed
Fault, concealed, queried
Fault, inferred
Fault, inferred, queried
Thrust fault, certain
Thrust fault, concealed
Thrust fault, inferred
Thrust fault, inferred, queried
Scratch boundary
Map boundary

Areas

Map units (polygons) are described in the polygon attribute table (table 5). The identities of the map units are recorded in the PTYPE field by map label (table 6). Map units are described more fully in the accompanying postscript file mo-se.ps2

Table 5 - Content of the polygon attribute tables.

Item name	Width	Output	Type	N. dec.	Description
AREA	4	12	F	3	Area of polygon in square meters
PERIMETER	4	12	F	3	Length of perimeter in meters
<coverage>#	4	5	B	- -	Unique internal control number
<coverage>-ID	4	5	B	- -	Unique identification number (see table 6)
PTYPE	35	35	C	- -	Unit label

Table 6 - Map units.

Map units			
ms	Qctl?	Qod?	Qtcs
Kgd	Qctm	Qod1	Qyf
Kgdp	Qctm?	Qod1?	Qyf(a)
KJf?	Qcto	Qod2	Tc
Qaf	Qcto(e)	Qod2?	Tcg
Qal	Qcto?	Qoe	Tm
Qal?	Qctp	Qoe?	Tm?
Qb	Qctp(e)	Qof	Tmd
Qbs	Qctp?	Qof?	Tml
Qc	Qcts	Qs	Trc
Qct	Qcts?	Qsd	Ts
Qct?	Qd	Qt	Tsm
Qct1	Qfd	Qt?	Tsm?
Qcth	Qls	QTc	Tus
Qctl	Qls?	Qtcm?	Tus?
Qctl(e)	Qod	Qtcp	Tv?
			Tvb

Points

Point information (strikes and dips) is recorded as coordinate and related information and are described in the Point Attribute Table (Table 7). Note the ARC/INFO coverages cannot contain both point and polygon information, so only coverages with point information (mo_strc) will have a point attribute table, and these coverages will not have a polygon attribute table.

Table 7 - Content of the Point Attribute Tables

ITEM NAME	WIDTH	OUTPUT	TYPE	N.DEC	DESCRIPTION
AREA	4	12	F	3	this field is not used
PERIMETER	4	12	F	3	this field is not used
<coverage>#	4	5	B		unique internal control number
<coverage>-ID	4	5	B		Unique identification
PTTYPE	35	35	C		point type (see Table 8)
DIP	3	3	I		dip angle in degrees
STRIKE	3	3	I		strike angle in degrees

Table 8 - Point types recorded in the PTTYPE field

Name
Anticline arrow
Approximate bedding
Bedding
Circle
Dip direction from distant view
Fault, strike-slip, right lateral
Flat bedding
Overturned bedding
Spring
Syncline arrow
Triangle
Vertical bedding

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