GEOLOGIC MAP DATABASE OF TEXAS

By

Douglas B. Stoeser,[1] Nancy Shock,[2] Gregory N. Green,[1]
Gayle M. Dumonceaux,[1] and William D. Heran[1]

U.S. Geological Survey Data Series 170
2005

U.S. DEPARTMENT OF THE INTERIOR
U.S. GEOLOGICAL SURVEY

[1] U.S. Geological Survey, P.O. Box 25046, Denver CO 80225
[2] National Park Service, 12795 West Alameda Parkway, Denver CO 80225

GEOLOGIC MAP DATABASE OF TEXAS

By

Douglas B. Stoeser, Nancy Shock, Gregory N. Green,
Gayle M. Dumonceaux, and William D. Heran

ABSTRACT

The purpose of this report is to release a digital geologic map database for the State of Texas. This database was compiled for the U.S. Geological Survey (USGS) Minerals Program, National Surveys and Analysis Project, whose goal is a nationwide assemblage of geologic, geochemical, geophysical, and other data. This release makes the geologic data from the Geologic Map of Texas available in digital format. Original clear film positives provided by the Texas Bureau of Economic Geology were photographically enlarged onto Mylar film. These films were scanned, georeferenced, digitized, and attributed by Geologic Data Systems (GDS), Inc., Denver, Colorado. Project oversight and quality control was the responsibility of the U.S. Geological Survey. ESRI ArcInfo coverages, AMLs, and shapefiles are provided.

INTRODUCTION

This dataset was developed to provide a digital geologic map database of the Geologic Map of Texas (Barnes 1992). This data set was prepared in cooperation with the Texas Bureau of Economic Geology.

The Geologic Map of Texas was originally printed as four 1:500,000-scale sheets. Original clear-film positives of these sheets provided by the Texas Bureau of Economic Geology were photographically enlarged onto Mylar film. The Mylar films were scanned, georeferenced, digitized, and attributed under contract by Geologic Data Systems (GDS), Inc., Denver, Colorado, to produce three thematic layers for each sheet (contacts, faults, and bar and ball fault decoration). Subsequently, each thematic layer was edge matched and combined into a single Statewide layer for each theme. Thus there are three digital layers that cover the entire State: formations and contacts, geologic faults, and graphic decorations (see details below). The merged layers are still at 1:500,000-scale, and their use at scales significantly different is not recommended. The provided data formats are ESRI ArcInfo coverage interchange .e00 and ESRI shapefile.

INCLUDED FILES

The following files are included with this publication.

DS_170.pdf	The description and purpose of this publication in Adobe Acrobat .pdf format.
DS_170.doc	The description and purpose of this publication in Microsoft Word format.
TX-meta.txt	Metadata for the Digital Geologic Map of Texas database.
load.aml	An ArcInfo arc macro language program to load and rebuild the databases.
texas.e00	An ArcInfo export interchange format version of the contacts and formations.
fault.e00	An ArcInfo export interchange format version of mapped faults.
bar-ball.e00	An ArcInfo export interchange format version of fault bar and ball symbols.
gds1shd.e00	An ArcInfo shadeset for the texas.aml created by Geologic Data Systems, Inc.
texas.aml	An ArcInfo aml program to draw a plot of the map.
texas.box	An ArcInfo geologic map legend.
projection.txt	A text file that lists the map projection information.
texas_shp.zip	A zipped file of the ArcInfo shapefiles for the Geologic Map of Texas.

LINE ATTRIBUTES

In addition to the standard ArcInfo attributes, each line has two attributes defined by the authors.

Item name	INFO format			Purpose
ORIG_LINE_LABEL	12	12	C	The original symbol used on the source map.
CARTO	3	3	I	An assigned ARCPLOT line weight and color.

Notes on attributes
ORIG_LINE_LABEL: This is the digital map line label.

POLYGON ATTRIBUTES

In addition to the standard ArcInfo attributes, each polygon has four attributes defined by the authors.

Item name	INFO format			Purpose
GDS_SHD	3	3	I	An ARCPLOT polygonshade color assigned by GDS.
UNIQUE-ID	6	6	I	A unique identification number for each polygon.
ORIG_LABEL	12	12	C	The original label modified for standard alphabet.
UNIT_NAME	150	150	C	Unit name or description from map legend.

Notes on attributes
GDS_SHD: An ArcInfo ARCPLOT shadeset supplied by Geologic Data Systems, Inc.
ORIG_LABEL: This is the original digital map label. See Appendix A for the geologic symbol substitutions.

PROJECTION

Projection:	Lambert Conformal Conic
Horizontal datum:	NAD 27
Spheroid:	Clarke, 1866
Units:	meters
Standard parallel 1:	33 degrees North
Standard parallel 2:	45 degrees North
Central meridian:	-100 degrees
Base latitude:	0 degrees
False northing:	0
False easting:	0

ERRORS AND MODIFICATIONS

The authors believe that there were several minor errors on the 1992 analog (paper) version of the explanation. These are documented below. Corrections were made to the Texas ArcInfo database, to the simplified ARCPLOT explanation, and to the metadata where possible.

Legend Explanation Column	Correction
Trans-Pecos Texas and east bank of the Pecos River	1. Dewey Lake Red beds should be Dewey Lake Redbeds.
	2. Wilke Ranch Formation should be Wilkie Ranch Formation.
	3. Cienequita Formation should be Cieneguita Formation.
	4. Allamore Formation should be Alamoore Formation.
	5. The El Paso Formation and Bliss Sandstone, undivided age range is incorrectly shown. The correlation of map units box shows the age range to be only Lower Ordovician. The age range of the box needs to be extended downward into the Upper Cambrian.
	6. The Woods Hollow Shale, Fort Pena Formation, Alsate Shale, Marathon Limestone, and Dagger Flat Sandstone, undivided age range is incorrectly shown. The correlation of map units box shows the age range to be only Lower Ordovician. The age range of the box needs to be extended downward into the Upper Cambrian.

North and Central Texas including Panhandle	1. Placid Creek Shale should be Placid Shale.
Tertiary igneous and volcaniclastic rocks, Trans-Pecos Texas	1. "…rocks of sneed (Cox) Mountain" should be "rocks of Sneed (Cox) Mountain."
	2. Cottonwood Springs Basalt should be Cottonwood Spring Basalt.
Western part of the Trans-Pecos Texas explanation column	1. Eagle Mountain Sandstone should be Eagle Mountains Sandstone.
Eastern part of the Trans-Pecos Texas and High Plains	1. Tornilla Formation should be Tornillo Formation.
	2. Cretaceous age symbol of the Javelina Member of the Tornillo Formation should be changed to capital **K**, both in the legend and within the correlation of map units box.
	3. Bissett conglomerate should be Bissett Conglomerate.
North, Central, and South Texas including Quaternary for all of West Texas	1. Quaternary-Tertiary bolson deposits, Quaternary-Tertiary deposits, undivided, and Uvalde Gravel age range is incorrectly shown. The correlation of map units boxes are shown as Quaternary only. The age range of the box should be extended downward into the Tertiary.
North, Central, and South Texas including Quaternary for all of West Texas and East Texas and Gulf Coast to Rio Grande	1. Cadell Formation should be Caddell Formation.
Western part of the Trans-Pecos Texas	1. Cretaceous rock, undivided is incorrectly labeled **Ku**. This Cretaceous rock, undivided should be **K** on the legend to match the analog (paper) Texas map. Please note that **Ku** is used correctly for Upper Cretaceous rocks, undivided on the paper map and on the "East Texas and Gulf Coast to Rio Grande" explanation column.

One minor modification to the spatial database was made. A polygon was added in the Big Bend National Park area. This is a Tertiary intrusive mapped by Maxwell and others (1967) but not shown on the Barnes (1992) map. The end user can modify the database to match the original paper geologic map by deleting the polygon, UNIQUE-ID = 303480, and its bounding contact from the ArcInfo contact and formation layer database.

CREDITS

As part of an effort to create a national geologic map database utilizing State-scale geologic maps a digital version of the Geologic Map of Texas was required. The Texas Bureau of Economic Geology supplied the stable base inked greenlines of the geologic map. Doug Stoeser and Nancy Shock wrote and monitored the contract with Geologic Data Systems, Inc. to digitize and attribute the map from the greenlines. GDS created the preliminary ArcInfo database. Greg Green edge matched the thematic layers, assembled the files for publication, and created the final ArcInfo databases. Gayle Dumonceaux created test plots in Adobe Illustrator from the ArcInfo files. Bill Heran checked each igneous outcrop against the published literature. The authors wish to thank Laura Biewick, Curt Huffman, and Tom Judkins of the USGS for their critical and helpful reviews.

REFERENCES CITED

Barnes, V.E. (compiler), 1992, Geologic Map of Texas, Austin, University of Texas at Austin, Bureau of Economic Geology, SM003, scale 1:500,000.

Maxwell, R.A., Lonsdale, J.T., Hazzard, R.T., and Wilson, J.A., 1967, Geology of Big Bend National Park, Brewster County Texas: Austin, University of Texas at Austin, Bureau of Economic Geology, Publication. No. 6711, 230 p.

Stoeser, Douglas B., Green, Gregory N., Morath, Laurie C., Heran, William D., Wilson, Anna B., Moore, David W., and Van Gosen, Bradley S., 2005, Preliminary Integrated Geologic Map Databases for the United States, Central States: Montana, Wyoming, Colorado, New Mexico, Kansas, Oklahoma, Texas, Missouri, Arkansas, and Louisiana: U.S. Geological Survey Open–File Report 2005-1351 (online only: http://pubs.usgs.gov/of/2005/1351/).

APPENDIX A—STANDARD AGE SYMBOLS

[from Stoeser and others (2005)]

These standard age symbols are those used in the ORIG_LABEL field in place of the age symbols originally used on the paper map.

Standard Symbol	Time Unit
PH	Phanerozoic
CZ	Cenozoic
Q	Quaternary
H	Holocene/recent
PS	Pleistocene
T	Tertiary
N	Neogene
PE	Paleogene
PO	Pliocene
MI	Miocene
OG	Oligocene
EO	Eocene
PN	Paleocene
MZ	Mesozoic
K	Cretaceous
J	Jurassic
TR	Triassic
PZ	Paleozoic
P	Permian
C	Carboniferous
PA	Pennsylvanian
M	Mississippian
D	Devonian
S	Silurian
O	Ordovician
CA	Cambrian
pCA	Precambrian
PR	Proterozoic
Z	Late Proterozoic (570–900 Ma)
Y	Middle Proterozoic (900–1600 Ma)
Y3	Late Middle Proterozoic (900–1200 Ma)
Y2	Middle Middle Proterozoic (1200–1400 Ma)
Y1	Early Middle Proterozoic (1400–1600 Ma)
X	Early Proterozoic (1600–2500 Ma)
X3	Late Early Proterozoic (1600–1800 Ma)
X2	Middle Early Proterozoic (1800–2100 Ma)
X1	Early Early Proterozoic (2100–2500 Ma)