Spatial Digital Database of the Geologic Map of Catalina Core Complex and San Pedro Trough, Pima, Pinal, Gila, Graham, and Cochise Counties, Arizona

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Digital database by Douglas M. Hirschberg[1], G. Stephen Pitts[1], and Karen S. Bolm[2]

Open-File Report 02-365
Digital database version 1.0

Prepared in cooperation with the University of Arizona

2002
(map originally published in 1992)

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

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Introduction

The geologic map of Catalina Core Complex and San Pedro Trough by Dickinson (1992) was digitized for input into a geographic information system (GIS) by the U.S. Geological Survey staff and contractors in 2000-2001.

This digital geospatial database is one of many being created by the U.S. Geological Survey as an ongoing effort to provide geologic information in a geographic information system (GIS) for use in spatial analysis. The resulting digital geologic map database data can be queried in many ways to produce a variety of geologic maps and derivative products. Digital base map data (topography, roads, towns, rivers, lakes, and so forth) are not included; they may be obtained from a variety of commercial and government sources. This database is not meant to be used or displayed at any scale larger than 1:125,000 (for example, 1:100,000 or 1:24,000). The digital geologic map plot files (ccc-map. pdf, ccc-map.rtl) that are provided herein are representations of the database.

The map area is located in southern Arizona (fig. 1). Figure 2 is a simplified page size list of the map units, and figure 3 is a page size plot of a generalized map of this database. This report lists the geologic map units, the methods used to convert the geologic map data into a digital format, the ArcInfo GIS file structures and relationships, and explains how to download the digital files from the U.S. Geological Survey public access World Wide Web site on the Internet. The manuscript and digital data review by Lorre Moyer (USGS) is greatly appreciated.

List of Map Units

This list of map units was derived from Dickinson (1992).

Stratified Rock Units

Qal Alluvium (Quaternary)—Stream valley alluvium (shown along San Pedro and Gila Rivers only)

Nbf Basin fill (Neogene)—Dissected basin fill (Quiburis Formation and correlatives), together with overlying terrace and pediment gravel sheets and local alluvium

Tsm San Manuel Formation (lower Miocene) of the San Pedro Trough—Undifferentiated

Tsmk Kannally Member

Tsmt Tucson Wash Member

Tsz Soza Canyon facies (volcanic clasts)

Tsk Kelsey Canyon facies (granitic clasts)

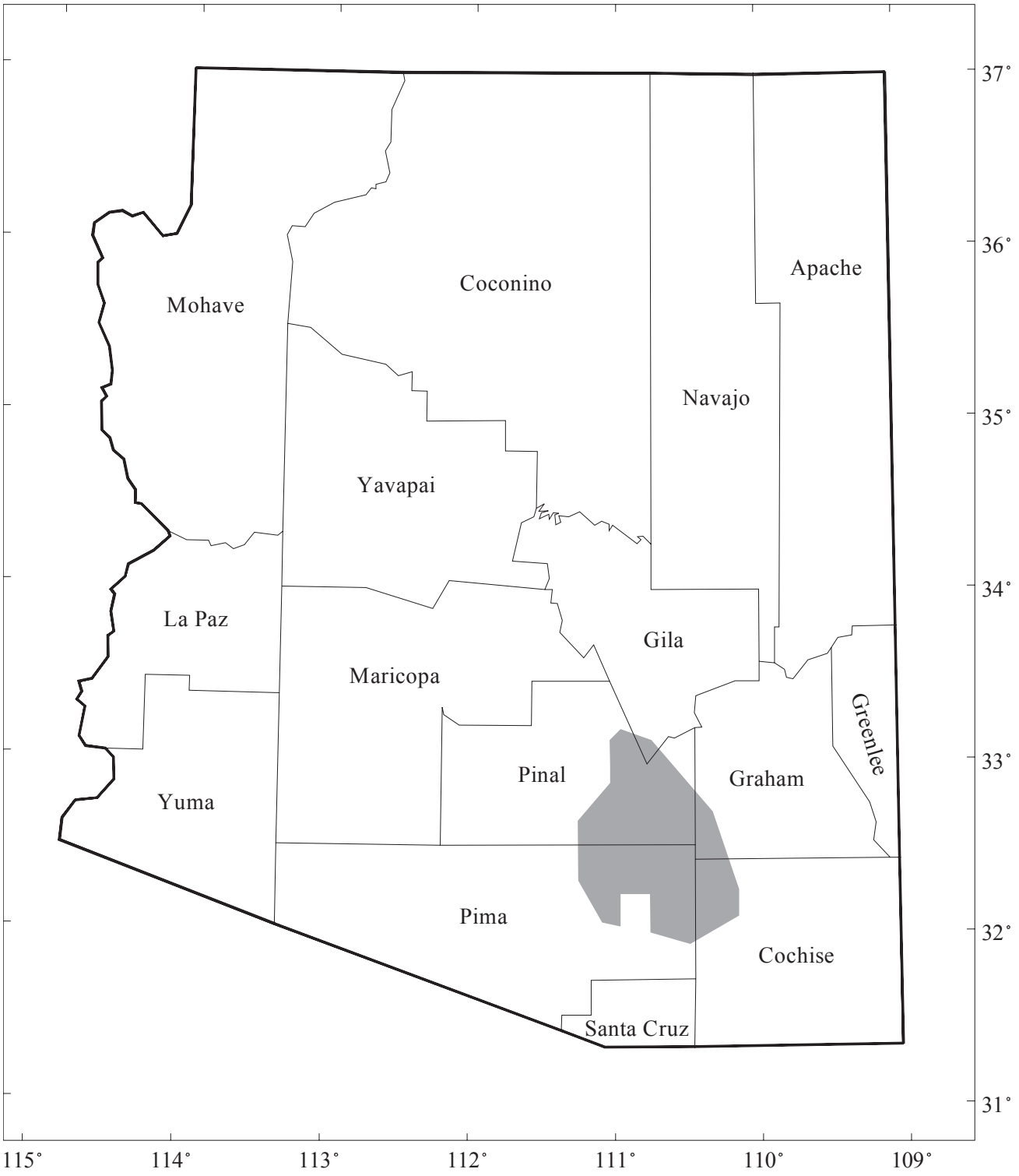

Figure 1. Index map showing the geographic extent of Catalina Core Complex and San Pedro Trough (shaded fill) with respect to Arizona counties

Figure 2. Explanation for the simplified digital geologic map of Catalina Core Complex and San Pedro Trough, Arizona

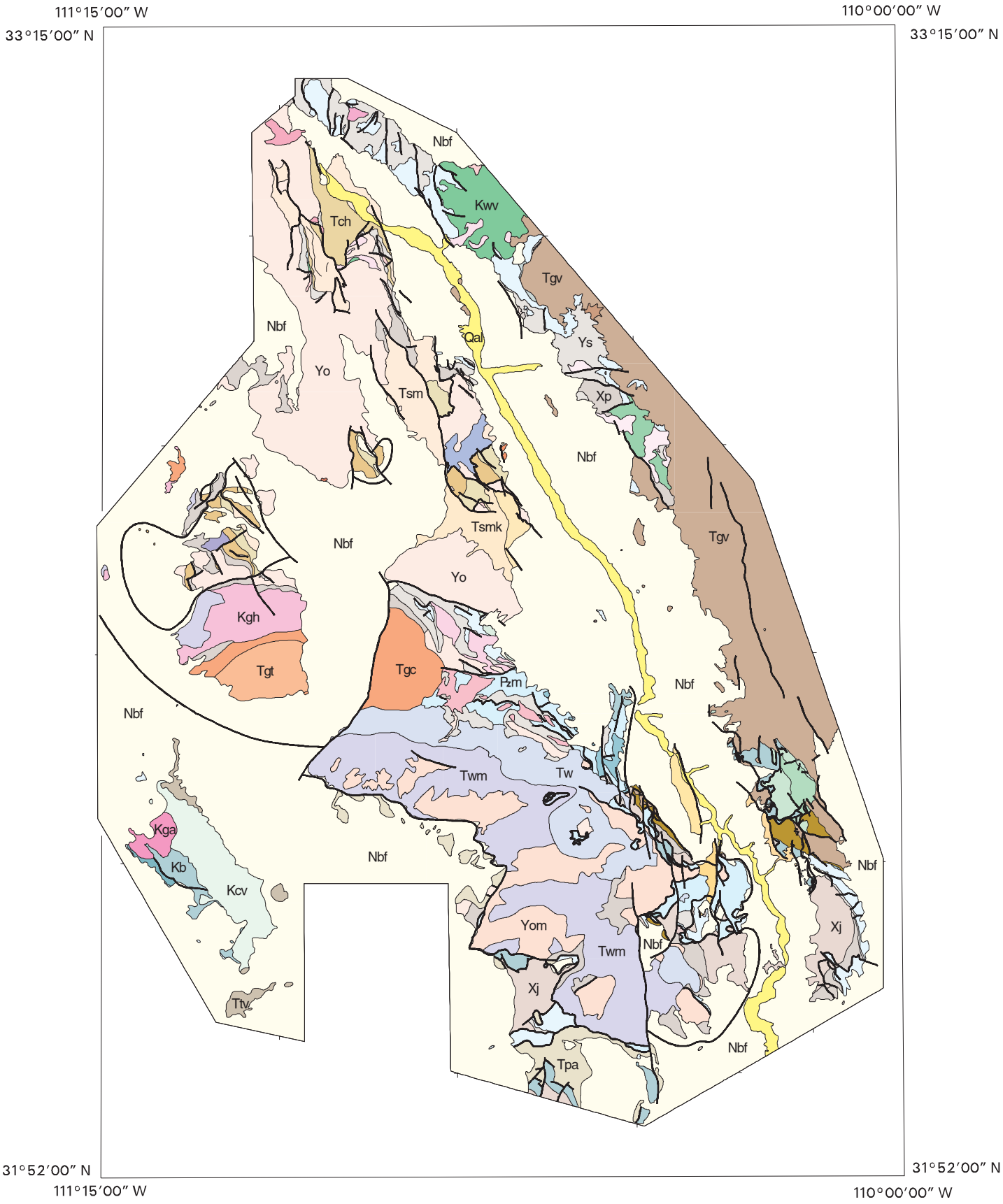

Figure 3. Simplified digital geologic map of Catalina Core Complex and San Pedro Trough, Arizona

Tsp Paige Canyon facies (metamorphic clasts)

Tpa Pantano Formation (Oligocene-Miocene) of Cienega Gap and Tucson Basin

Tcs Cloudburst Formation (Upper Oligocene to Lower Miocene) of the San Pedro Trough—sedimentary upper member

Tch Hackberry Wash facies

Tcv volcanic lower member

Ttv Tertiary volcanics (Oligocene) of the Tucson Mountains

Tgv Galiuro Volcanics (Upper Oligocene)

Tgw basal "Whitetail Conglomerate"

Tmi Mineta Formation (Oligocene) of Cañada Atravesada and Teran Basin

Kcv Cat Mountain Rhyolite (Upper Cretaceous to Paleocene?)—Volcanic and sedimentary rocks

Kaf American Flag Formation (Upper Cretaceous to Paleocene?)—Volcanic and sedimentary rocks

Kcs Cascabel Formation (Upper Cretaceous to Paleocene?)—Volcanic and sedimentary rocks

Kmv Muleshoe Volcanics (Upper Cretaceous to Paleocene?)—Volcanic and sedimentary rocks

Kgv Glory Hole Volcanics (Upper Cretaceous to Paleocene?)—Volcanic and sedimentary rocks

Kwv Williamson Canyon Volcanics (Upper Cretaceous to Paleocene?)—Volcanic and sedimentary rocks

Kp Pinkard Formation (Upper Cretaceous)

Kb Bisbee Group (Lower Cretaceous)

Km metamorphosed

Jr Recreation Redbeds (mid-Jurassic?)

Jw Walnut Gap Volcanics (mid-Jurassic?)—Red beds

PZs Paleozoic (Cambrian to Permian) strata

PZm metamorphosed Paleozoic strata

Ys Apache Group and Troy Quartzite (Proterozoic)—Includes intrusive diabase sills and dikes

Xp Pinal Schist (Proterozoic)—Dominantly metasedimentary rocks

Intrusive Rock Units

Tir rhyolitic plugs and dikes

Tgt Tortolita granitic pluton

Tgf Fortified Peak pluton

Tgc Catalina granitic pluton

Tw Wilderness granite suite (Eocene)—Two-mica granite

Twm mylonitic two-mica granite

Kgc Copper Creek Granodiorite (Upper Cretaceous to Paleocene?)

Kdi Diorite—Semitabular dioritic bodies (Upper Cretaceous to Paleocene?)

Krp Rice Peak granodiorite porphyry (Upper Cretaceous to Paleocene?)

Kgp granitic porphyry dikes and sills (Upper Cretaceous to Paleocene?)

Kgh Chirreon Wash granodiorite (Upper Cretaceous to Paleocene?)

Kgl Leatherwood quartz diorite (Upper Cretaceous to Paleocene?)

Kgr Rattler Granodiorite (Upper Cretaceous to Paleocene?)

Kgt Tortilla Quartz Diorite (Upper Cretaceous to Paleocene?)

Kga Amole granitic pluton (Upper Cretaceous to Paleocene?)

Yo Oracle/Ruin granite suite (Middle Proterozoic)

Yom mylonitic Oracle/Ruin granite suite

Yg Granodiorite (Precambrian)

Yd Diorite (Precambrian)

Xj Johnny Lyon granodiorite suite (Lower Proterozoic)

Xjm mylonitic Johnny Lyon granodiorite suite (Lower Proterozoic)

Data Sources, Processing, and Accuracy

Staff and contractors at the U.S. Geological Survey Southwest Field Office (Tucson, Arizona) scanned the published paper map by Dickinson (1992), digitized the line, polygon, and point features, edited the digital files, standardized the database to an interim version, and then plotted and compared the digital map with the original published map to check for digitizing and attributing errors. Processing at the U.S. Geological Survey was done in ArcInfo version 7.2.1 installed on a Sun Ultra 2 workstation.

The overall accuracy (with respect to the location of features) of the spatial digital database (see figures 2 and 3 for page-size versions) is probably no better than +/- 100 meters. This digital database is not meant to be used or displayed at any scale larger than 1:125,000 (for example, 1:100,000 or 1:24,000).

GIS Documentation

The digital geologic database of the Catalina Core Complex and San Pedro Trough includes two ArcInfo datasets (CCC125K and CCCPNT).

The CCC125K dataset contains linear geologic data (arcs) for contacts, faults, and folds; areal geologic data (polygons) for rock units; and regions for allochthons. It has an arc attribute table, CCC125K.AAT, that relates to the CCC125K.CON, CCC125K.ST2 and CCC125K.REF look-up tables. It has a polygon attribute table, CCC125K.PAT, which relates to the CCC125K.RU and CCC125K.REF look-up tables. And it also has a polygon-region attribute table, CCC125K.PATALLOCH, that relates to the CCC125K.REF look-up table.

The CCCPNT dataset contains geologic point data for bedding, foliation, and fault attitudes. It has a point attribute table, CCCPNT.PAT, that relates to the CCCPNT.REF look-up table.

These data files are described below. Figure 4 shows the relationships between the feature attribute tables and the look-up tables.

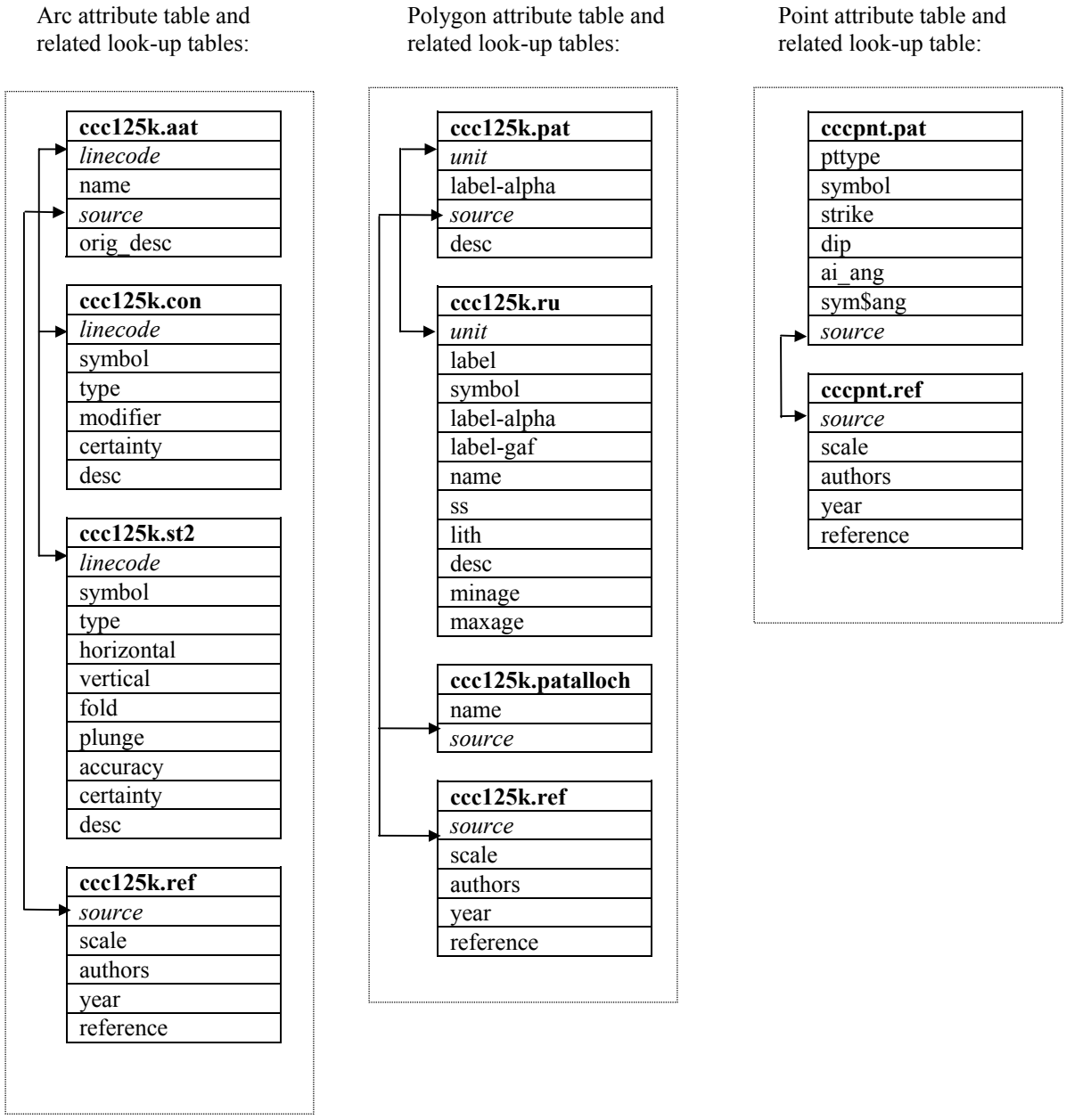

Figure 4: Relationships between feature attribute tables and look-up tables.

Linear Features

Descriptions of the items identifying linear features such as contacts, boundaries (for example, lines of latitude and longitude, state boundaries) and structures in the arc attribute table, ccc125k.aat, are as follows:

ccc125k.aat			
ITEM NAME	ITEM TYPE	ITEM LENGTH	ATTRIBUTE DESCRIPTION
linecode	integer	3	Numeric code used to identify type of linear feature. Linecodes < 100 are used for contacts and boundaries which are described in the ccc125k.con file. Linecodes > 100 and < 600 represent structural features which are described in the ccc125k.st2 file.
name	character	36	Name given to structural feature.
source	integer	4	Numeric code used to identify the data source for the linear feature. Complete references for the sources are listed in the ccc125k.ref file.
orig_desc	character	150	Original description of linear feature from Dickinson (1992). Faults described by Dickinson (1992) as "plated" were coded as thrust faults in this database.

Attribute descriptions for items in the contact (and boundary) look-up table, ccc125k.con (for use with the geol_dia.lin lineset), are as follows:

ccc125k.con			
ITEM NAME	ITEM TYPE	ITEM LENGTH	ATTRIBUTE DESCRIPTION
linecode	integer	3	Numeric code (a value < 100) used to identify type of contact or boundary. (This item also occurs in ccc125k.aat.)
symbol	integer	3	Line symbol number used by ArcInfo to plot lines. Symbol numbers refer to the geol_dia.lin lineset
type	character	10	Major type of line, for example, contact, state boundaries, lines of latitude and longitude used for neatlines.
modifier	character	20	Line type modifier, that is, approximate, concealed, gradational. No entry implies 'known.'
certainty	character	15	Degree of certainty of contact or boundary, that is, inferred, uncertain. No entry implies 'certain.'
desc	character	100	Written description or explanation of contact or boundary.

Attribute descriptions for items in the structure look-up table, ccc125k.st2 (for use with the geol_dia.lin lineset), are as follows:

ccc125k.st2			
ITEM NAME	ITEM TYPE	ITEM LENGTH	ATTRIBUTE DESCRIPTION
linecode	integer	3	Numeric code (a value > 100 and < 600) used to identify type of structural feature. (This item also occurs in ccc125k.aat.)
symbol	integer	3	Line symbol number used by ArcInfo to plot arcs. Symbol numbers refer to the geol_dia.lin lineset.
type	character	10	Major type of structure, i.e., fault, fracture, fold, other.
horizontal	character	20	Type of horizontal fault movement, for example, left-lateral, right-lateral. No entry implies 'unknown.'
vertical	character	20	Type of vertical fault movement, for example, normal. No entry implies 'unknown.'
fold	character	15	Type of fold, for example, anticline, syncline.
plunge	character	15	Type of plunge on fold, that is, horizontal, plunging, plunging in, plunging out. No entry implies 'unknown'.
accuracy	character	15	Line type modifier indicating degree of accuracy, that is, approximately located, concealed, gradational. No entry implies 'known.'
certainty	character	15	Degree of certainty of contact or boundary, that is, inferred, uncertain. No entry implies 'certain.'
desc	character	100	Written description or explanation of structural feature.

Areal Features

Descriptions of the items identifying geologic units in the polygon attribute table, ccc125k.pat, are as follows:

ccc125k.pat			
ITEM NAME	ITEM TYPE	ITEM LENGTH	ATTRIBUTE DESCRIPTION
unit	integer	4	Numeric code used to identify the rock unit, which is described in the ccc125k.ru look-up table. (This item also occurs in ccc125k.ru.)
label-alpha	character	10	Rock unit label (abbreviation) used to label unit on map with standard alphabetic characters. (This item was joined from the ccc125k.ru look-up table.)
source	integer	4	Numeric code used to identify the data source for the rock unit. Complete references for the sources are listed in the ccc125k.ref file.
desc	character	250	Formal or informal unit name. (Values for this item were joined from the ccc125k.ru look-up table).

Attribute descriptions for items in the lithology (rock unit) look-table, CCC125K.RU (for use with the WPGCMYK.SHD shadeset), are as follows:

ccc125k.ru			
ITEM NAME	ITEM TYPE	ITEM LENGTH	ATTRIBUTE DESCRIPTION
unit	integer	4	Numeric code used to identify rock unit. (This item also occurs in ccc125k.pat.)
label	character	10	Rock unit label (abbreviation) used to label unit on the map. This item was calculated equal to 'label-gaf'.
symbol	integer	3	Shadeset symbol number used by ArcInfo to plot a filled/shaded polygon. The symbol numbers used in this file refer to the wpgcmyk.shd shadeset.
label-alpha	character	10	Rock unit label (abbreviation) for use with standard alphabetic characters (for example, PZ for Paleozoic).
label-gaf	character	10	Rock unit label (abbreviation) that uses the geoageFullAlpha font, version 1.1.
name	character	7	The prefix portion of the rock unit label that does not include subscripts. (If subscripting is not used in the original unit label, then the 'name' entry is the same as the 'label-alpha' entry.)
ss	character	3	The suffix portion of the geologic unit label that includes subscripts. No entry implies no subscript.
lith	character	20	Major type of lithostratigraphic unit, that is, unconsolidated sediments, sedimentary rocks, metasedimentary rocks, intrusive rocks, extrusive rocks, metamorphic rocks, water, ice.
desc	character	250	Formal or informal unit name
minage	character	7	Minimum stratigraphic age of lithologic unit, for example, CRET - Cretaceous, TERT - Tertiary, PREC - Precambrian.
maxage	character	7	Maximum stratigraphic age of lithologic unit

Descriptions of the items identifying allochthons in the polygon-region attribute table, ccc125k.patalloch, are as follows:

ccc125k.patalloch			
ITEM NAME	ITEM TYPE	ITEM LENGTH	ATTRIBUTE DESCRIPTION
name	character	50	Name given to allochthon.
source	integer	4	Numeric code used to identify the data source for the allochthon. Complete references for the sources are listed in the ccc125k.ref file.

Point Features

Descriptions of the items identifying geologic map symbols are given in the point attribute table, cccpnt.pat, which is defined as follows:

cccpnt.pat			
ITEM NAME	ITEM TYPE	ITEM LENGTH	ATTRIBUTE DESCRIPTION
pttype	character	30	Basic type of geologic point data being represented (for example, inclined foliation, fault attitude, etc.)
symbol	integer	3	Marker symbol number used by ArcInfo to symbolize the point feature. Symbol numbers refer to the scamp2d.mrk markerset (after Matti and others, 1997).
strike	integer	3	Strike of bedding, foliation, or cleavage. Strike is an azimuth angle (measured in degrees from 0 to 360 in a clockwise direction from North).
dip	integer	2	Dip of bedding, foliation, cleavage. This value is an angle measured (in degrees from 0 to 90) down from the horizontal; thus a horizontal dip is 0 degrees and a vertical dip is 90 degrees.
ai_ang	integer	4	The ArcInfo equivalent to the strike. This value is measured counter-clockwise from east. An interim value used to calculate sym$angle
sym$ang	integer	4	The angle used to complete the mathematical rotation of the point symbol to its proper orientation on the map. The various point symbols in the scamp2d.mrk markerset (after Matti and others, 1997) had to be rotated by different amounts to achieve their proper map orientation. This value is also the $angle pseudoitem value for the point.
source	integer	4	Numeric code used to identify the data source for the structural map symbol. Complete references for the sources are listed in the cccpnt.ref file.

Source Attributes

Descriptive source or reference information for the ccc125k and cccpnt ArcInfo datasets is stored in the ccc125k.ref and cccpnt.ref files, respectively. Attribute descriptions for items in the ccc125k.ref and cccpnt.ref data source files are as follows:

ccc125k.ref and cccpnt.ref			
ITEM NAME	ITEM TYPE	ITEM LENGTH	ATTRIBUTE DESCRIPTION
source	integer	4	Numeric code used to identify the data source. (This item also occurs in the ccc125k.aat, ccc125k.pat, and cccpnt.pat files.)
scale	integer	8	Scale of source map. (This value is the denominator of the proportional fraction that identifies the scale of the map that was digitized or scanned to produce the digital map.)
authors	character	200	Author(s) or compiler(s) of source map entered as last name, first name or initial, and middle initial.
year	integer	4	Source (map) publication date
reference	character	250	Remainder of reference in USGS reference format.

Obtaining Digital Data

The digital version of the geologic map is available in ArcInfo exchange (*.e00) format (see Appendix A). These data are being published and this product is a stand-alone product (Dickinson and others, 2002, ver. 1.0). These data are maintained in a Universal Transverse Mercator map projection:

Projection: UTM
Zone: 12
Datum: NAD27
Units: meters
Spheroid: Clarke1866

Note that this projection can also be described in the following manner:

Projection: Transverse Mercator
scale factor at central meridian: 0.999600
longitude of central meridian -111.0000
latitude of origin 0.0000
false easting (meters) 500000.0000
false northing (meters) 0.0000

To obtain copies of the digital data, do one of the following:

Download the digital files from the USGS public access World Wide Web site on the internet: **URL = http://geopubs.wr.usgs.gov/open-file/of02-365** or

2. Anonymous FTP from **geopubs.wr.usgs.gov**, in the directory: **pub/open-file/of02-365**

The Internet sites contain the digital geologic map both as ArcInfo interchange-format files (*.e00) and as plot files (ccc-map.pdf/.eps) (see Appendix A). To utilize the spatial database you must have a GIS that is capable of reading ArcInfo interchange-format files.

Obtaining Paper Maps

Paper copies of the digital geologic map are not available from the U.S. Geological Survey. However, with access to the Internet and access to a large-format color plotter that can interpret either PDF (portable document format) , or EPS (encapsulated postscript) files, a 1:125,000-scale paper copy of the map can be made, as follows:

1. Download the digital version of the map, **ccc-map.pdf** or **ccc-map.eps**, from the USGS public access World Wide Web site on the Internet using the
URL = http://geopubs.wr.usgs.gov/open-file/of02-365
or
2. Anonymous FTP the plot file, **ccc-map.pdf** or **ccc-map.eps**, from:
geopubs.wr.usgs.gov, in the directory:
pub/open-file/of02-365
3. This file can be plotted by any large-format color plotter that can interpret EPS or PDF files. The finished plot is about 34.5 inches wide by 50 inches tall (specify 36 inches by 60 inches to allow for margins).

References Cited

Dickinson, William R., 1992, Geologic map of Catalina Core Complex and San Pedro Trough, Pima, Pinal, Gila, Graham, and Cochise Counties, Arizona: Arizona Geological Survey Contributed Map CM-92-C, 1 plate, scale 1:125,000.

Matti, J.C., Miller, F.K., Powell, R.E., Kennedy, S.A., Bunyapanasarn, T.P., Koukladas, C., Hauser, R.M., and Cossette, P.M., 1997, Geologic-point attributes for digital geologic-map data bases produced by the Southern California Areal Mapping Project (SCAMP): U.S. Geological Survey Open-File Report 97-859, 7 p.

Appendix A - List of digital files in the Catalina Core Complex and San Pedro Trough GIS

--Use import.aml to import all the *.e00 files for use in ArcInfo.

Report text in portable document format:

- ccc125k.pdf

Primary ArcInfo interchange-format (*.e00) and metadata (*.met) files for the digital geology:

- ccc125k.e00 - line and poly GIS
- cccpnt.e00 - point GIS
- ccc125k.met - metadata

Adobe portable document format (*.pdf) and encapsulated postscript (*.eps) plot files for the geologic map sheet:

- ccc-map.pdf
- ccc-map.eps

ArcInfo AML to setup the GIS:

- import.aml – macro program to automatically import ArcInfo (*.e00) files

Appendix B - Metadata file (ccc125k.met) for Catalina Core Complex and San Pedro Trough GIS

Identification_Information:
Citation:
Citation_Information:
Originator: William R. Dickinson, University of Arizona
Originator: Douglas M. Hirschberg, University of Arizona
Originator: G. Stephen Pitts, University of Arizona
Originator: Karen S. Bolm, U.S. Geological Survey
Publication_Date: 2001
Title:
Spatial Digital Database of the Geologic Map of Catalina Core Complex and San Pedro Trough, Pima, Pinal, Gila, Graham, and Cochise Counties, Arizona
Edition: Version 1.0
Geospatial_Data_Presentation_Form: map
Series_Information:
Series_Name: Open-File Report
Issue_Identification: 02-365
Publication_Information:
Publication_Place: Menlo Park, California
Publisher: U.S. Geological Survey
Online_Linkage: <http://geopubs.wr.usgs.gov/open-file/of02-365>

Description:
Abstract:
A paper copy of the Geologic Map of the Catalina Core Complex and San Pedro Trough (Dickinson, 1992) was scanned and digitized by U.S. Geological Survey staff and contractors at the Southwest Field Office (Tucson, AZ) in 2000-2001 for input into an ArcInfo geographic information system (GIS). The resulting geologic map database (in ArcInfo format) can be queried in many ways to produce a variety of geologic maps. Digital base map data files. (topography, roadways, towns, and hydrography) are not included: they may be obtained from a variety of commercial and government sources. Geologic map graphics and plot files that are provided in the Open-File Report are representations of the digital database and are not designed to be cartographic products. All datasets and associated files are available on the Internet at http://geopubs.wr.usgs.gov/open-file/of02-365

Purpose:
This database was constructed to provide a geologic map GIS for use in spatial analysis by a variety of users. The digital geologic database can be queried in many ways to produce a variety of derivative geologic maps. The data are not meant to be used at any scale larger than 1:125,000 (for example, 1:100,000 or 1:24,000)

Supplemental_Information:
This database consists of two major ArcInfo datasets. The CCC125K dataset contains arc features representing geologic contacts,

faults, and folds; polygon features representing geologic rock (map) units; and regions representing allochthons. The CCCPNT dataset contains point features representing geologic point data of bedding, foliation, and fault attitude.

The datasets and related INFO look-up tables have been "exported" into ArcInfo interchange files with a .e00 file extension and will need to be imported for use. Lower case letters are consistently used in naming datasets and other files although they may be listed in uppercase letters for emphasis in this document and the Open-File Report it accompanies.

Time_Period_of_Content:
  Time_Period_Information:
    Single_Date/Time:
      Calendar_Date: 2002
  Currentness_Reference: September 20, 2002

Status:
  Progress: Complete
  Maintenance_and_Update_Frequency: None Planned

Spatial_Domain:
  Bounding_Coordinates:
    West_Bounding_Coordinate: -111.2
    East_Bounding_Coordinate: -110.1
    North_Bounding_Coordinate: 33.1
    South_Bounding_Coordinate: 31.9

Keywords:
  Theme:
    Theme_Keyword_Thesaurus: none
    Theme_Keyword: geology
    Theme_Keyword: geologic map
  Place:
    Place_Keyword_Thesaurus: none
    Place_Keyword: United States of America
    Place_Keyword: Arizona
    Place_Keyword: Pima County
    Place_Keyword: Pinal County
    Place_Keyword: Gila County
    Place_Keyword: Graham County
    Place_Keyword: Cochise County

Access_Constraints: none

Use_Constraints:
  This digital database is not meant to be used or displayed at any scale larger than 1:125,000 (for example, 1:100,000 or 1:24,000). Any hardcopies utilizing these datasets shall clearly indicate their source. If users modify the data in any way they are obligated to describe on the hardcopy map the types of modifications they have performed. Users specifically agrees not to misrepresent these datasets, nor to imply that changes they made were approved by the U.S. Geological Survey.

Point_of_Contact:
Contact_Information:
Contact_Person_Primary:
Contact_Person: Mark Gettings
Contact_Organization: U.S. Geological Survey
Contact_Position: Geologist
Contact_Address:
Address_Type: mailing and physical address
Address:
USGS Geologic Division
DeConcini Environmental and Natural Resources Bldg.
520 North Park Ave., Room 357
University of Arizona
City: Tucson
State_or_Province: AZ
Postal_Code: 85719-5035
Country: USA
Contact_Voice_Telephone: 520-670-5507
Contact_Facsimile_Telephone: 520-670-5571
Contact_Electronic_Mail_Address: mgetting@usgs.gov

Data_Set_Credit:
D.M. Hirschberg (University of Arizona), G.S. Pitts (University of Arizona), and K.S. Bolm (USGS), scanned Dickinson's (1992) geologic map; registered the resulting image; digitized the arcs and points; captured and positioned the annotation, attributed the arcs, polygons, and points; defined and populated the look-up tables; prepared the data model; wrote the metadata; and produced the Open-File Report text. See the Process_Step sections for more details on these steps.

Native_Data_Set_Environment:
SunOS, 5.6, sun4u UNIX, ArcInfo version 7.2.1 and Microsoft Windows 2000, ArcInfo version 8.1

Data_Quality_Information:
Attribute_Accuracy:
Attribute_Accuracy_Report:
Attribute accuracy was verified by manual comparison of Dickinson's (1992) map with hard copy printouts.

Logical_Consistency_Report:
All lines and points on the source map representing geologic features were digitized as arcs (line segments) or points. These features were digitized once. Lines intersect only where intended. Overshoots (dangling arcs) and undershoots are present as represented in Dickinson's (1992) map. Line segments are a set of sequentially numbered coordinate pairs. No duplicate features exist nor duplicate points in a data string. Intersecting lines are separated into individual line segments at the point of intersection.
Polygon and chain-node topology present. All polygons have a label. All polygons close. Polygons intersecting the neatline are closed along the border. Segments making up the outer and inner boundaries of a polygon tie end-to-end to completely

enclose the area. Point data are represented by two sets of coordinate pairs, each with the same coordinate values. All nodes are represented by a single coordinate pair which indicates the beginning or end of a line segment.

Completeness_Report:
None of the base map data (roads, washes, etc.) from Dickinson's (1992) map were digitized nor are represented in this database.

Positional_Accuracy:
Horizontal_Positional_Accuracy:
Horizontal_Positional_Accuracy_Report:
The horizontal positional accuracy is probably no better than +/- 100 meters.
The base for Dickinson's (1992) map is believed to be two U. S. Geological Survey 1:250,000 scale sheets spliced at the 32nd degree parallel and enlarged in scale to 1:125,000. Inaccuracies in the digital data would include inherent errors in Dickinson's (1992) map.

Lineage:
Source_Information:
Source_Citation:
Citation_Information:
Originator: Dickinson, W.R.
Publication_Date: 1992
Title: Geologic map of Catalina Core Complex and San Pedro Trough
Geospatial_Data_Presentation_Form: map
Series_Information:
Series_Name: Contributed Map
Issue_Identification: CM-92-C
Publication_Information:
Publication_Place: Tucson, AZ
Publisher: Arizona Geological Survey
Source_Scale_Denominator: 125,000
Type_of_Source_Media: paper
Source_Time_Period_of_Content:
Time_Period_Information:
Single_Date/Time:
Calendar_Date: 1992
Source_Currentness_Reference: publication date
Source_Citation_Abbreviation: Dickinson (1992)
Source_Contribution:
geologic features; contacts, faults, folds, point observations, and rock units.

Process_Step:
Process_Description:
A paper copy of the geologic map (Dickinson, 1992) map was obtained and scanned at 300 dpi to create an 8-bit grayscale TIFF. The TIFF was registered to an ArcInfo coverage (dataset) of tics which had been mathematically generated in ArcInfo then projected to the Universal Transverse Mercator (UTM) projection.
Process_Date: 2000

Process_Step:
  Process_Description:
    A dataset (CCC125K) with arc and polygon topology was
    created from the same mathematically generated and projected
    set of tics. Items (fields) were added to its arc attribute
    table (.aat) and polygon attribute table (.pat) as needed.
  Process_Date: 2000

Process_Step:
  Process_Description:
    Arcs were digitized and attributed on-screen in a 'heads-up'
    fashion with the image of the geologic map (Dickinson, 1992)
    as background. Each arc was attributed as soon as it was
    digitized. Attribute selections were entered via an
    on-screen menu for quality control purposes.
  Process_Date: 2000

Process_Step:
  Process_Description:
    Check plots on mylar were produced for each sector. First,
    generic line symbols were used to proof the locational
    fidelity of the linework to Dickinson (1992). Later, check
    plots with symbolized lines were produced to check for
    attributional fidelity to the source map. Updates to the
    CCC125K dataset were made as needed.
  Process_Date: 2000

Process_Step:
  Process_Description:
    Polygon topology was re-built. Polygons were attributed in
    the 'heads-up' fashion mentioned previously.
  Process_Date: 2000

Process_Step:
  Process_Description:
    Check plots were produced to proof for polygon attributional
    fidelity to Dickinson (1992). Polygons were edited
    as needed.
  Process_Date: 2000

Process_Step:
  Process_Description:
    An ArcInfo dataset (CCCPNT) with point topology was created.
    Items were added to the dataset's point attribute table (.pat)
    as needed.
  Process_Date: 2000

Process_Step:
  Process_Description:
    Points were digitized and attributed in the same 'heads-up'
    fashion. Check plots were produced to proof locational,
    rotational, and other attributional qualities of the points.
  Process_Date: 2000

Process_Step:

Process_Description:
Look-up tables for the CCC125K and CCCPNT datasets were defined and populated.
Process_Date: 2000

Process_Step:
Process_Description:
Rock unit annotation was captured for the CCC125K dataset and annotation strings were repositioned as needed. Dip values were captured for the necessary points in the CCCPNT dataset and repositioned as needed.
Process_Date: 2001

Process_Step:
Process_Description:
Arcs representing "plated" faults on the source map were re-coded as thrust faults (linecode = 171 or linecode = 173) in the arc attribute table (CCC125K.AAT). (Descriptions for the linecodes are given in the CCC125K.ST2 look-up table; however, for archival purposes, Dickinson's (1992) original line descriptions are given in the ORIG_DESC item in the CCC125K.AAT file.)
Process_Date: 2001

Process_Step:
Process_Description:
First draft of metadata created by D.M. Hirschberg using FGDCMETA.AML ver. 1.2 05/14/98
Process_Date: 20010221

Process_Step:
Process_Description:
Polygons designated by Mark Gettings, U. S. Geological Survey were grouped into regions and each region was attributed with the allochthon name according to Dickinson (1992).
Process_Date: 2002

Spatial_Reference_Information:
Horizontal_Coordinate_System_Definition:
Planar:
Grid_Coordinate_System:
Grid_Coordinate_System_Name: Universal Transverse Mercator
Universal_Transverse_Mercator
UTM_Zone_Number: 12
Transverse_Mercator
Scale_Factor_at_Central_Meridian: 0.999600
Longitude_of_Central_Meridian: -111.0
Latitude_of_Projection_Origin: 0.000000
False_Easting: 500000.000000
False_Northing: 0.0000000
Planar_Coordinate_Information:
Planar_Coordinate_Encoding_Method: coordinate pair
Coordinate_Representation:
Abscissa_Resolution: 0.000256
Ordinate_Resolution: 0.000256
Planar_Distance_Units: meters

Geodetic_Model:
Horizontal_Datum_Name: North American Datum of 1927
Ellipsoid_Name: Clarke 1866
Semi-major_Axis: 6378206.400000
Denominator_of_Flattening_Ratio: 294.978698

Entity_and_Attribute_Information:
Overview_Description:
Entity_and_Attribute_Overview:
The Catalina Core Complex and San Pedro Trough 125k GIS includes a geologic arc attribute table, CCC125K.AAT, that relates to the CCC125K.CON (contact look-up table), CCC125K.ST2 (structure look-up table), and CCC125K.REF (source reference look-up table) files; a rock-unit polygon attribute table (CCC125K.PAT) that relates to the CCC125K.RU (rock-unit look-up table) and CCC125K.REF (source reference lookup table) files; an allochthon region attribute table, (CCC125K.PATALLOCH) that relates to the CCC125K.REF (source reference lookup table) file; and a point attribute table, CCCPNT.PAT, that relates to the CCCPNT.REF (source reference look-up table) file.

Entity_and_Attribute_Detail_Citation:
A detailed description of the items in the Catalina Core Complex and San Pedro Trough 125k database are given in the text of the Open-File Report 02-365 available in Adobe Acrobat PDF format on the World Wide Web at http://geopubs.wr.usgs.gov/open-file/of02-365/

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Contact_Organization_Primary:
Contact_Organization: U.S. Geological Survey
Contact_Instructions:
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operation, or support by USGS.
This spatial digital database for the geologic map of Catalina Core Complex and San Pedro Trough is not meant to be used or displayed at any scale larger than 1:125,000 (for example, 1:100,000 or 1:24,000).

Standard_Order_Process
Digital_Form
Digital_Transfer_Information
Format_Name: ArcInfo Export format, Adobe PDF
Format_Version_Number: ArcInfo 7.2.1 and 8.1
Format_Information_Content: Attributed line, polygon, and point data
File_Decompression_Technique: No compression applied
Transfer_Size: 40.5 MB
Digital_Transfer_Option
Online_Option
Computer_Contact_Information
Network_Address
Network_Resource_Name:
<http://geopubs.wr.usgs.gov/open-file/of02-365>
Fees: none

Metadata_Reference_Information:
Metadata_Date: 2001
Metadata_Review_Date: 2001
Metadata_Contact:
Contact_Information:
Contact_Organization_Primary:
Contact_Organization: U.S. Geological Survey
Contact_Person: Douglas Hirschberg
Contact_Position: GIS Specialist
Contact_Address:
Address_Type: mailing and physical address
Address: 520 N. Park Ave, Suite 355
City: Tucson
State_or_Province: AZ
Postal_Code: 85719
Country: USA
Contact_Voice_Telephone: (520) 670-5514
Contact_Facsimile_Telephone: (520) 670-5571
Contact_Electronic_Mail_Address: dmhirsch@usgs.gov
Metadata_Standard_Name: FGDC Content Standards for Digital Geospatial Metadata
Metadata_Standard_Version: FGDC-STD-001-1998
Metadata_Access_Constraints: none
Metadata_Use_Constraints: none