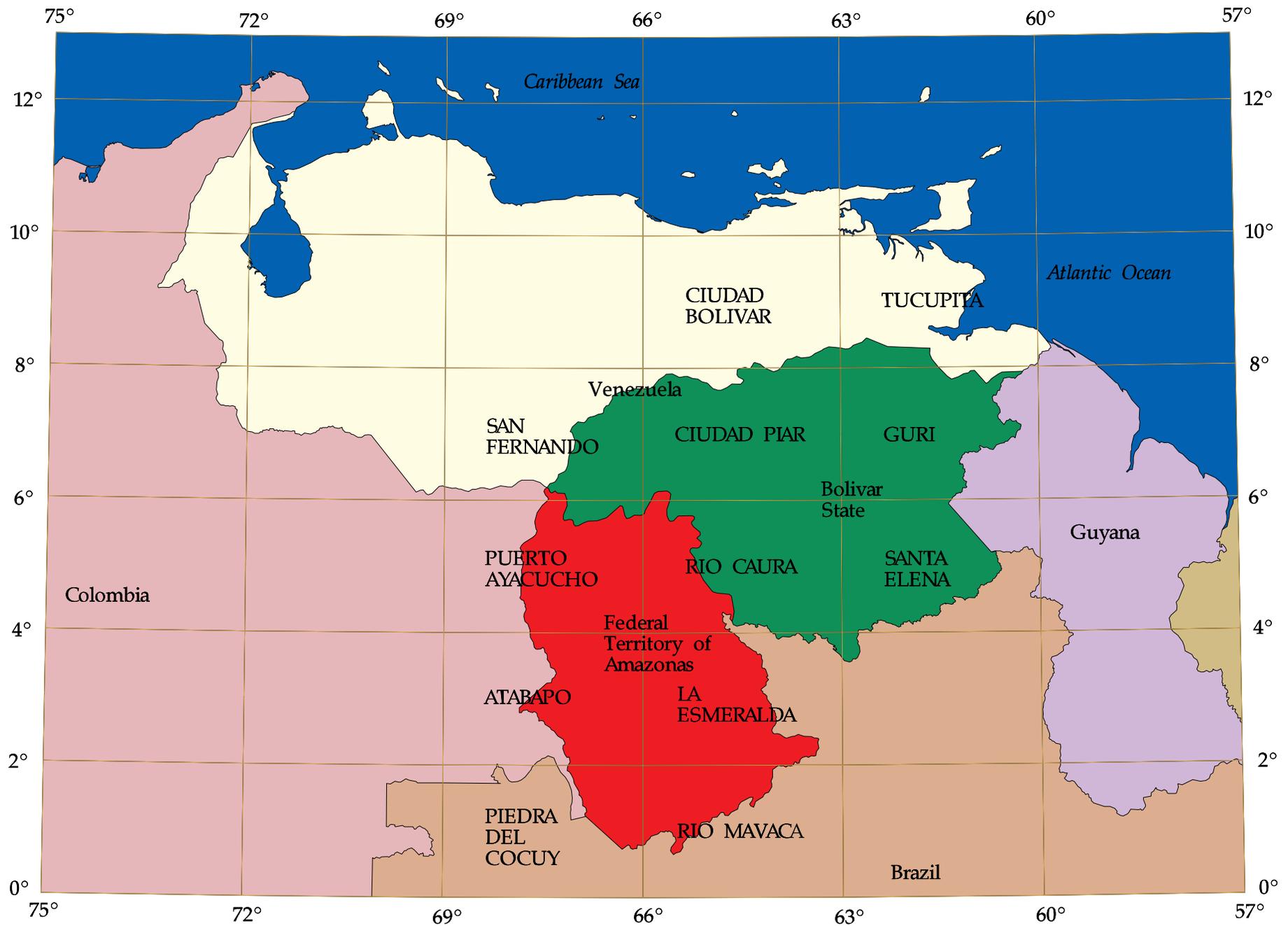


Study Area



U.S. GEOLOGICAL SURVEY DIGITAL DATA SERIES DDS-46

**Geology and Resource Assessment of the Venezuelan Guayana Shield at
1:500,000 scale--A Digital Representation of Maps published by the U.S.
Geological Survey**

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1997

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Graphical map depictions on this disc are intended to be used within the map scale limits applicable to the source data. Although software enables the user to show images on the disc at various scales, the user is cautioned to refer to the source documentation for the appropriate map scale limitations.

SYSTEM REQUIREMENTS

This CD-ROM was produced in accordance with the ISO 9660 standard and thus allows access to the disc files by computers with ISO 9660 software drivers. The disc contains Adobe Acrobat Reader software for DOS, Macintosh, UNIX, and Windows. as well as a graphics display program, ArcView 1, for Windows 3.x.

ARCVIEW 1 REQUIREMENTS

80386 or better CPU
Math coprocessor recommended
Windows 3.0 or higher but not Windows 95
4 Mb of RAM, 8 Mb strongly recommended
15 Mb of disk space
Super VGA graphics system, 256 colors, 640x480 pixels minimum,
1024x768 pixels strongly recommended
Microsoft-compatible mouse
Windows-supported printer

ARCVIEW 3 REQUIREMENTS

80486 or better CPU
Windows 3.x, 95, or NT
12-16 Mb of RAM
Super VGA graphics system, 256 colors, 640x480 pixels minimum,
1024x768 pixels strongly recommended
Microsoft-compatible mouse

or

Power Macintosh or 68040 processor with FPU
System 7.1 or higher
16-18 Mb of RAM

ADOBE ACROBAT READER REQUIREMENTS:

A color display monitor is strongly recommended with all platforms.

Windows 95 - rs32e30.exe

Minimum

**i386(TM), i486(TM), Pentium(R), or
Pentium Pro processor-based personal computer
Microsoft Windows 95, or Windows NT(R) 3.51 or later
8 MB of RAM (16 MB for Windows NT) for Acrobat Reader
10 MB of available hard-disk space**

Recommended

**Pentium processor-based personal computer
Windows 95 or Windows NT
16 MB of RAM (24 for Windows NT)
10 MB of available hard-disk space**

Windows NT - rs32e30.exe

Minimum

**i386(TM), i486(TM), Pentium(R), or Pentium Pro processor
Windows NT(R) 3.51 or later
8 MB of RAM (16 MB for Windows NT) for Acrobat Reader
10 MB of available hard-disk space**

Recommended

**Pentium processor-based personal
computer
Windows 95 or Windows NT
16 MB of RAM (24 for Windows NT)
10 MB of available hard-disk space**

Windows 3.1 and 3.11 for Workgroups - rs16e30.exe

Minimum

- i386(TM), i486(TM), Pentium(R), or Pentium Pro processor
- Microsoft Windows 3.1 or Windows 3.11 or later
- 8 MB of RAM for Acrobat Reader
- 5 MB of available hard-disk space

Recommended

- Pentium processor-based personal computer
- Microsoft Windows 3.1 or Windows 3.11 or later
- 12 MB of available hard-disk space

Macintosh and Power Macintosh - Install Acrobat Reader 3.0, Search Installer

Minimum

- Macintosh with a 68020 or greater processor, or Power Macintosh
- 3.5 MB of RAM (5 MB for Power Macintosh) available to Acrobat Reader
- Apple(R) System Software version 7.1 or later

Recommended

- 8 MB of available RAM
- Apple System Software version 7.1.2 or later
- 12.5 MB of available hard-disk space

UNIX

UNIX system requirements

- 12 MB of disk space for Acrobat Reader
- System with 32 MB of RAM

Sun SPARCstation(R) - acroread_sunos_30.tar.gz, acroread_solaris_30.tar.gz

- SunOS 4.1.3 or 4.1.4 or Solaris 2.3, 2.4, or 2.5
- OpenWindows(TM) (version 3.0 or later),
- Motif(TM) window manager (1.2.3 or later),
- OpenLook version 3.0, or
- Common Desktop Environment (CDE) 1.0 and above

HP Series 9000 workstation, model 700 or greater - acroread_hpux_30.tar.gz

- HP-UX 9.0.3 or later
- X Window System(TM) X11R5 with HP-VUE or CDE 1.0
- 12 megabytes of available hard disk space
- A 32 megabyte machine

IBM(R) RS/6000(TM) workstation - [acroread_aix_30.tar.gz](#)
AIX 4.1 or later operating system
Common Desktop Environment (CDE) or the Motif window manager

Silicon Graphics workstation - [acroread_irix_30.tar.gz](#)
IRIX(TM) 5.3 or later operating system software
12 megabytes of available hard disk space
A 32 megabyte machine

Linux workstation - [acroread_linux_30.tar.gz](#)
LINUX 5.3 or later operating system software
12 megabytes of available hard disk space
A 32 megabyte machine

OS/2 - [aro2e30.exe](#)

Minimum

- i386, i486, Pentium, or Pentium Pro processor
- IBM OS/2 Warp or Warp Connect 3.0 or later
- 4 MB application RAM available to Acrobat Reader
- 8 MB RAM for system
- 5 MB hard-disk space, plus 5 MB temporary space for installation

Recommended

- Pentium processor
- IBM OS/2 Warp 4.0

Adobe Acrobat Reader 1.0 for DOS - [rdrdos10.zip](#)

Minimum

- i386(TM), i486(TM) processor
- Microsoft DOS 3.3 or later
- 2 MB of RAM for Acrobat Reader.
- 5 MB of available hard-disk space

Recommended

- 486 or Pentium processor
- Microsoft DOS 3.3 or later
- 4 MB of application RAM
- 5 MB of available hard-disk space

ACKNOWLEDGEMENTS

Development of the graphics files on this CD-ROM spanned many years and involved the efforts of many organizations and individuals. Most of the digitizing was done in GSMAP by Jeff Wynn (USGS) and others. The northern quadrangles were scanned from tracings created by the geologists. Thanks to the following authors for those materials:

John H. Stewart (USGS)
Dennis P. Cox (USGS)
Floyd Gray (USGS)
W. E. Brooks (USGS)

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Haydée Rincón
Nelson Rivero
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Frank Tovar

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Frederick C. Brunstein
David A. Emery
Will Stettner
Judith W. Stoeser

CONTACTS

Questions about the digital map files should be directed to:

| | | |
|---------------|-----------|-------------------|
| Paul Schruben | Telephone | (703) 648-6142 |
| | FAX | (703) 648-6383 |
| | E-mail | pschrube@usgs.gov |

U.S. Geological Survey, 954 National Center, Reston, VA 22092-9998.

Technical help with ArcView 1 is available via CompuServe by typing GO ESRI.

Copies of the original USGS 1993 Bulletin 2062, MF maps cited in the Documentation of Map Units, and this CD-ROM are available from:

U.S. Geological Survey, Map Distribution
Box 25286, Building 810
Federal Center
Denver, CO 80225

Tel: (888) ASK-USGS or for overseas access
(703) 648-6045.

DISC CONTENTS

| | |
|------------------|---|
| 1readme.doc | description of this disc, Microsoft Word 6 file |
| 1readme.mac.text | description of this disc, Macintosh/OS plain text file |
| 1readme.pdf | description of this disc, Adobe Acrobat Reader file |
| 1readmet.dos | description of this disc, MS/DOS plain text file |
| 1readmew.dos | description of this disc, Microsoft Word for Windows 1.0 |
| acrobat | directory containing Acrobat Reader installer programs |
| arcview1 | directory containing ArcView 1 installer program |
| arcpc | directory containing PC ArcView 1 and ARC/INFO directories. Same as arcunix6 directory below |
| arcunix6 | directory containing ArcView 1 and ARC/INFO 6.1.2 directories |
| at | directory containing files for Atabapo 2°x3° quadrangle (Venezuela part) |
| at.aml | ARC/PLOT program for 44" Versatec plotter |
| at.av | ArcView 1 file |
| at.gra | ARC/PLOT plot file for 44" Versatec plotter |
| atanno5 | geographic place name annotation |
| atcor | correlation of map units |
| atft | faults |
| atge | geology |
| atlab | rock unit label annotation |
| atleg | map legend |
| atma | buried magnetic bodies |
| atout | quadrangle outline and lat/long numbers |
| atpl | political boundaries |
| atscale | 1:500,000 scale bar, title, & citation |
| atst | single-line tributaries |
| attc | latitude/longitude tics for this quadrangle |
| grid | lat/long grid lines for index map |
| index | index map showing quadrangle names and surrounding countries |
| vztc | latitude/longitude numbers and tics for index map |
| ay | directory containing Puerto Ayacucho 2°x3° quadrangle (Venezuela part) files |
| ay.aml | ARC/PLOT program for 44" Versatec plotter |
| ay.av | ArcView 1 file |
| ay.gra | ARC/PLOT plot file for 44" Versatec plotter |
| ayanno5 | geographic place name annotation |
| aycor | correlation of map units |
| aycrlbm | crosssection geology rock unit labels |
| aycrm | crosssection geology polygons |
| ayft | faults |
| ayge | geology |
| aylab | rock unit label annotation |
| aylabcr | crosssection line and annotation on map |
| ayleg | map legend |
| aylegpt | map legend points |
| ayma | buried magnetic bodies |
| aymalab | buried magnetic bodies |
| ayout | quadrangle outline and lat/long numbers |
| aypl | political boundaries |
| ayrd | roads |

| | |
|----------|---|
| ayscale | 1:500,000 scale bar, title, & citation |
| ayst | single-line tributaries |
| aytc | latitude/longitude tics for this quadrangle |
| grid | lat/long grid lines for index map |
| index | index map showing quadrangle names and surrounding countries |
| vztc | latitude/longitude numbers and tics for index map |
| ca | directory containing Río Caura 2° by 3° quadrangle files |
| ca. aml | ARC/PLOT program for 44" Versatec plotter |
| ca. av | ArcView 1 file |
| ca. gra | ARC/PLOT plot file for 44" Versatec plotter |
| caanno5 | geographic place name annotation |
| caacor | correlation of map units |
| caft | faults |
| cage | geology |
| calab | rock unit label annotation |
| caleg | map legend |
| calegpt | map legend points |
| cama | buried magnetic bodies |
| caout | quadrangle outline and lat/long numbers |
| capl | political boundaries |
| cascalle | 1:500,000 scale bar, title, & citation |
| cast | single-line tributaries |
| catc | latitude/longitude tics for this quadrangle |
| grid | lat/long grid lines for index map |
| index | index map showing quadrangle names and surrounding countries |
| vztc | latitude/longitude numbers and tics for index map |
| es | directory containing La Esmeralda 2°x3° quadrangle (Venezuela part) files |
| es. aml | ARC/PLOT program for 44" Versatec plotter |
| es. av | ArcView 1 file |
| es. gra | ARC/PLOT plot file for 44" Versatec plotter |
| esanno5 | geographic place name annotation |
| esacor | correlation of map units |
| esft | faults |
| esge | geology |
| eslab | rock unit label annotation |
| esleg | map legend |
| eslegpt | map legend points |
| esma | buried magnetic bodies |
| esout | quadrangle outline and lat/long numbers |
| espl | political boundaries |
| esscale | 1:500,000 scale bar, title, & citation |
| esst | single-line tributaries |
| estc | latitude/longitude tics for this quadrangle |
| grid | lat/long grid lines for index map |
| index | index map showing quadrangle names and surrounding countries |
| vztc | latitude/longitude numbers and tics for index map |
| gu | directory containing Guri and southern part of the Tucupita 2°x3° quadrangles files |
| grid | lat/long grid lines for index map |
| gu. aml | ARC/PLOT program for 44" Versatec plotter |

| | |
|---------|--|
| gu. av | ArcView 1 file |
| gu. gra | ARC/PLOT plot file for 44" Versatec plotter |
| guanno5 | geographic place name annotation |
| gucor | correlation of map units |
| guft | faults |
| guge | geology |
| gulab | rock unit label annotation |
| guleg | map legend |
| gulegpt | map legend points |
| guout | quadrangle outline and lat/long numbers |
| gupl | political boundaries |
| gurd | roads |
| guscale | 1: 500,000 scale bar, title, & citation |
| gust | single-line tributaries |
| gutc | latitude/longitude tics for this quadrangle |
| index | index map showing quadrangle names and surrounding countries |
| vztc | latitude/longitude numbers and tics for index map |
| ma | directory containing Río Mavaca 2°x3° quadrangle (Venezuela part) |
| grid | lat/long grid lines for index map |
| index | index map showing quadrangle names and surrounding countries |
| ma. aml | ARC/PLOT program for 44" Versatec plotter |
| ma. av | ArcView 1 file |
| ma. gra | ARC/PLOT plot file for 44" Versatec plotter |
| maanno5 | geographic place name annotation |
| macor | correlation of map units |
| maft | faults |
| mage | geology |
| malab | rock unit label annotation |
| maleg | map legend |
| mama | buried magnetic bodies |
| maout | quadrangle outline and lat/long numbers |
| mascale | 1: 500,000 scale bar, title, & citation |
| mast | single-line tributaries |
| matc | latitude/longitude tics for this quadrangle |
| vztc | latitude/longitude numbers and tics for index map |
| pc | directory containing Piedra de Cocuy 2°x3° quadrangle (Venezuela part) files |
| grid | lat/long grid lines for index map |
| index | index map showing quadrangle names and surrounding countries |
| pc. aml | ARC/PLOT program for 44" Versatec plotter |
| pc. av | ArcView 1 file |
| pc. gra | ARC/PLOT plot file for 44" Versatec plotter |
| pcanno5 | geographic place name annotation |
| pccor | correlation of map units |
| pcft | faults |
| pcge | geology |
| pclab | rock unit label annotation |
| pclcg | map legend |
| pclcgpt | map legend points |
| pcma | buried magnetic bodies |

| | |
|---------|---|
| pcout | quadrangle outline and lat/long numbers |
| pcpl | political boundaries |
| pcscale | 1:500,000 scale bar, title, & citation |
| pcst | single-line tributaries |
| pctc | latitude/longitude tics for this quadrangle |
| vztc | latitude/longitude numbers and tics for index map |
| pi | directory containing Ciudad Piar and part of the Ciudad Bolivar 2°x3° quadrangles files |
| fnt040 | ARC/INFO font file necessary for sag fault line symbol |
| grid | lat/long grid lines for index map |
| index | index map showing quadrangle names and surrounding countries |
| pi.aml | ARC/PLOT program for 44" Versatec plotter |
| pi.av | ArcView 1 file |
| pi.gra | ARC/PLOT plot file for 44" Versatec plotter |
| pianno5 | geographic place name annotation |
| picor | correlation of map units |
| pift | faults |
| pi ge | geology |
| pilab | rock unit label annotation |
| pileg | map legend |
| pilegpt | map legend points |
| pima | kimberlite area |
| piout | quadrangle outline and lat/long numbers |
| pipl | political boundaries |
| pird | roads |
| piscale | 1:500,000 scale bar, title, & citation |
| pisr | structural lines from SLAR |
| pist | single-line tributaries |
| pitc | latitude/longitude tics for this quadrangle |
| vztc | latitude/longitude numbers and tics for index map |
| se | directory containing Santa Elena 2°x3° quadrangle (Venezuela part) files |
| grid | lat/long grid lines for index map |
| index | index map showing quadrangle names and surrounding countries |
| se.aml | ARC/PLOT program for 44" Versatec plotter |
| se.av | ArcView 1 file |
| se.gra | ARC/PLOT plot file for 44" Versatec plotter |
| seanno5 | geographic place name annotation |
| secor | correlation of map units |
| seft | faults |
| sege | geology |
| selab | rock unit label annotation |
| seleg | map legend |
| selegpt | map legend points |
| seout | quadrangle outline and lat/long numbers |
| sepl | political boundaries |
| serd | roads |
| sescale | 1:500,000 scale bar, title, & citation |
| sest | single-line tributaries |
| setc | latitude/longitude tics for this quadrangle |
| vztc | latitude/longitude numbers and tics for index map |
| sf | directory containing San Fernando de Apure 2°x3° quadrangle |

(Bolivar part) files

| | |
|----------------|--|
| grid | lat/long grid lines for index map |
| index | index map showing quadrangle names and surrounding countries |
| sf. aml | ARC/PLOT program for 44" Versatec plotter |
| sf. av | ArcView 1 file |
| sf. gra | ARC/PLOT plot file for 44" Versatec plotter |
| sfanno5 | geographic place name annotation |
| sfcor | correlation of map units |
| sfft | faults |
| sfge | geology |
| sflab | rock unit label annotation |
| sfleg | map legend |
| sflegpt | map legend points |
| sfout | quadrangle outline and lat/long numbers for ArcView |
| sfpl | political boundaries |
| sfscale | 1:500,000 scale bar, title, & citation |
| sfst | single-line tributaries |
| sftc | latitude/longitude tics for this quadrangle |
| vztc | latitude/longitude numbers and tics for index map |
| vz | directory containing combined map coverages for Venezuelan Guayana Shield, all quadrangles |
| av. mrk | ArcView markerset to be copied to the ARCHOME directory |
| av. txt | ArcView textset to be copied to the ARCHOME directory |
| deposit | mineral deposits, prospects and occurrences |
| equi2geo. prj | projection file for converting equidistant conic to decimal degrees |
| fnt040 | ARC/INFO font file necessary for sag fault line symbol |
| ge. ai | Illustrator 6.0 version of ge. eps |
| ge. eps | ARC/PLOT Postscript plot file for 44" Versatec plotter |
| ge. gra | ARC/PLOT plot file for 44" Versatec plotter |
| geo2equi. prj | projection file for converting decimal degrees to equidistant conic |
| grid | lat/long grid lines for index map |
| index | index map showing quadrangle names and surrounding countries |
| mrkse. mrk | ARC/PLOT markerset for other point symbols |
| myalgeol. mrk | ARC/PLOT markerset for cities, bedding, joint symbols |
| myplotter. shd | ARC/PLOT shadeset for geology patterns |
| myplt. lin | ARC/PLOT lineset for faults, roads, political boundaries |
| places | geographic place names |
| ra | mineral resource permissive areas map A |
| raanno | mineral resource permissive areas map A annotation |
| rb | mineral resource permissive areas map B |
| rbanno | mineral resource permissive areas map B annotation |
| rbstruct | mineral resource permissive areas map B structural features |
| scale | scalebar and projection information |
| vz. aml | ARC/PLOT program for 44" Versatec plotter |
| vz. av | ArcView 1 view file |
| vz. apr | ArcView 3 project file |
| vzcor | correlation of map units |
| vzctry | Northeast South America country borders |
| vzft | faults, annotation, joints, and bedding |

| | | |
|---------------|---|------------------------------|
| vzge | geology | |
| vzlab | rock unit annotation and leaders | |
| vzma | buried magnetic bodies | |
| vzout | outer edge of combined quadrangles in study area | |
| vzpl | study area political boundaries | |
| vzprov | Venezuela province boundaries for index map | |
| vzrd | roads | |
| vzst | single-line tributaries and annotation | |
| vztc | latitude/longitude numbers and tics for index map | |
| arcunix7 | directory containing ArcView 3 and ARC/INFO 7 directory | |
| vz | directory containing combined map coverages for Venezuelan Guayana Shield, all quadrangles. Same as in arcunix6/vz. | |
| bull2062 | directory containing text and figures from Bulletin 2062 | |
| doc | | |
| tables.doc | Word 5.1 | tables 1-2, 4-11 |
| tabside.doc | Word 5.1 | table 3 |
| mi f | | |
| b2062con.mi f | framemaker 3.0p1b | table of contents |
| b2062fnt.mi f | framemaker 3.0p1b | cover 1, cover 2, i, ii, iii |
| b2062txt.mi f | framemaker 3.0p1b | main body, p. 1-120 |
| rtf | | |
| b2062con.rtf | rich text (RTF) | table of contents |
| b2062txt.rtf | rich text (RTF) | main body, p. 3-5 |
| tif | | |
| vzget.tif | TIF | Plate 2, geology, key part |
| vzge.tif | TIF | Plate 2, geologic map part |
| vzmin.tif | TIF | Plate 6, mineral deposits |
| txt | | |
| b2062con.txt | text | table of contents |
| b2062fnt.txt | text | i, ii |
| b2062txt.txt | text | main body, p. 1-72 |
| dl g | directory containing Digital Line Graph (DLG) Optional files | |
| cor.dlg | correlation of map units in Equidistant Conic projection | |
| cordd.dlg | correlation of map units in decimal degrees | |
| ft.dlg | faults in Equidistant Conic projection | |
| ftdd.dlg | faults in decimal degrees | |
| ge.dlg | geology in Equidistant Conic projection | |
| gedd.dlg | geology in decimal degrees | |
| ptype.unl | rock unit names, descriptions, colors for Versatec plotter | |
| scale.dlg | scale bar in Equidistant Conic projection | |
| scaldd.dlg | scale bar in decimal degrees | |
| vzline.unl | fault and contact line types | |
| export | directory containing directories of ARC/INFO export files and programs | |
| at | directory containing Atabapo quadrangle files | |
| at.aml | ARC/PLOT program for 44" Versatec plotter | |
| at.av | ArcView 1 file | |
| at.gra | ARC/PLOT 1040 plot file for 44" Versatec plotter. This a binary file | |
| atanno5.e00 | geographic place name annotation | |
| atcor.e00 | correlation of map units | |
| atft.e00 | faults | |

| | |
|--------------|---|
| atge. e00 | geology |
| atlab. e00 | rock unit label annotation |
| atleg. e00 | map legend |
| atma. e00 | buried magnetic bodies |
| atout. e00 | quadrangle outline and lat/long numbers |
| atpl. e00 | political boundaries |
| atscale. e00 | 1: 500,000 scale bar, title, & citation |
| atst. e00 | single-line tributaries |
| attc. e00 | latitude longitude tics for this quadrangle |
| grid. e00 | lat/long grid lines for index map |
| import. aml | ARC program for importing coverage |
| index. e0* | index map showing quadrangle names and surrounding countries, files 0-1 |
| vztc. e00 | latitude longitude tics for index map |
| ay | directory containing Puerto Ayacucho quadrangle files |
| ay. aml | ARC/PLOT program for 44" Versatec plotter |
| ay. av | ArcView 1 file |
| ay. gra | ARC/PLOT 1040 plot file for 44" Versatec plotter. This a binary file |
| ayanno5. e00 | geographic place name annotation |
| aycor. e00 | correlation of map units |
| aycrlbm. e00 | cross section labels |
| aycrm. e00 | cross section arcs |
| ayft. e00 | faults |
| ayge. e00 | geology |
| aylab. e00 | rock unit label annotation |
| aylabcr. e00 | rock unit label annotation for cross section |
| ayleg. e00 | map legend |
| aylegpt. e00 | map legend points |
| ayma. e00 | buried magnetic bodies |
| aymalab. e00 | buried magnetic bodies labels |
| ayout. e00 | quadrangle outline and lat/long numbers |
| aypl. e00 | political boundaries |
| ayrd. e00 | roads |
| ayscale. e00 | 1: 500,000 scale bar, title, & citation |
| ayst. e00 | single-line tributaries |
| aytc. e00 | latitude longitude tics for this quadrangle |
| grid. e00 | lat/long grid lines for index map |
| import. aml | ARC program for importing coverage |
| index. e0* | index map showing quadrangle names and surrounding countries, files 0-1 |
| vztc. e00 | latitude longitude tics for index map |
| ca | directory containing Río Caura quadrangle files |
| ca. aml | ARC/PLOT program for 44" Versatec plotter |
| ca. av | ArcView 1 file |
| ca. gra | ARC/PLOT 1040 plot file for 44" Versatec plotter. This a binary file |
| caanno5. e00 | geographic place name annotation |
| cacor. e00 | correlation of map units |
| caft. e00 | faults |
| cage. e00 | geology |
| calab. e00 | rock unit label annotation |
| caleg. e00 | map legend |
| calegpt. e00 | map legend points |

| | |
|--------------|---|
| cama. e00 | buried magnetic bodies |
| caout. e00 | quadrangle outline and lat/long numbers |
| capl. e00 | political boundaries |
| cascale. e00 | 1: 500,000 scale bar, title, & citation |
| cast. e00 | single-line tributaries |
| catc. e00 | latitude longitude tics for this quadrangle |
| grid. e00 | lat/long grid lines for index map |
| import. aml | ARC program for importing coverage |
| index. e0* | index map showing quadrangle names and surrounding countries, files 0-1 |
| vztc. e00 | latitude longitude tics for index map |
| es | directory containing La Esmeralda quadrangle files |
| es. aml | ARC/PLOT program for 44" Versatec plotter |
| es. av | ArcView 1 file |
| es. gra | ARC/PLOT 1040 plot file for 44" Versatec plotter. This a binary file |
| esanno5. e00 | geographic place name annotation |
| escor. e00 | correlation of map units |
| esft. e00 | faults |
| esge. e00 | geology |
| eslab. e00 | rock unit label annotation |
| esleg. e00 | map legend |
| eslegpt. e00 | map legend points |
| esma. e00 | buried magnetic bodies |
| esout. e00 | quadrangle outline and lat/long numbers |
| espl. e00 | political boundaries |
| esscale. e00 | 1: 500,000 scale bar, title, & citation |
| esst. e00 | single-line tributaries |
| estc. e00 | latitude longitude tics for this quadrangle |
| grid. e00 | lat/long grid lines for index map |
| import. aml | ARC program for importing coverage |
| index. e0* | index map showing quadrangle names and surrounding countries, files 0-1 |
| vztc. e00 | latitude longitude tics for index map |
| gu | directory containing Guri and Tucupita quadrangle files |
| grid. e00 | lat/long grid lines for index map |
| gu. aml | ARC/PLOT program for 44" Versatec plotter |
| gu. av | ArcView 1 file |
| gu. gra | ARC/PLOT 1040 plot file for 44" Versatec plotter. This a binary file |
| guanno5. e00 | geographic place name annotation |
| gucor. e00 | correlation of map units |
| guft. e00 | faults |
| guge. e0* | geology files, 0-2 |
| gulab. e00 | rock unit label annotation |
| guleg. e00 | map legend |
| gulegpt. e00 | map legend points |
| guout. e00 | quadrangle outline and lat/long numbers |
| gupl. e00 | political boundaries |
| gurd. e00 | roads |
| guscale. e00 | 1: 500,000 scale bar, title, & citation |
| gust. e00 | single-line tributaries |
| gutc. e00 | latitude longitude tics for this quadrangle |
| import. aml | ARC program for importing coverage |

index. e0* index map showing quadrangle names and surrounding
 countries, files 0-1
 vztc. e00 latitude longitude tics for index map
 ma directory containing Río Mavaca quadrangle files
 grid. e00 lat/long grid lines for index map
 import. aml ARC program for importing coverage
 index. e0* index map showing quadrangle names and surrounding
 countries, files 0-1
 ma. aml ARC/PLOT program for 44" Versatec plotter
 ma. av ArcView 1 file
 ma. gra ARC/PLOT 1040 plot file for 44" Versatec plotter.
 This a binary file
 maanno5. e00 geographic place name annotation
 macor. e00 correlation of map units
 maft. e00 faults
 mage. e00 geology
 malab. e00 rock unit label annotation
 maleg. e00 map legend
 mama. e00 buried magnetic bodies
 maout. e00 quadrangle outline and lat/long numbers
 mascale. e00 1: 500,000 scale bar, title, & citation
 mast. e00 single-line tributaries
 matc. e00 latitude longitude tics for this quadrangle
 vztc. e00 latitude longitude tics for index map
 pc directory containing Piedra de Cocuy quadrangle files
 grid. e00 lat/long grid lines for index map
 import. aml ARC program for importing coverage
 index. e0* index map showing quadrangle names and surrounding
 countries, files 0-1
 pc. aml ARC/PLOT program for 44" Versatec plotter
 pc. av ArcView 1 file
 pc. gra ARC/PLOT 1040 plot file for 44" Versatec plotter.
 This a binary file
 pcanno5. e00 geographic place name annotation
 pccor. e00 correlation of map units
 pcft. e00 faults
 pcge. e00 geology
 pclab. e00 rock unit label annotation
 pcleg. e00 map legend
 pclegpt. e00 map legend points
 pcma. e00 buried magnetic bodies
 pcout. e00 quadrangle outline and lat/long numbers
 pcpl. e00 political boundaries
 pcscale. e00 1: 500,000 scale bar, title, & citation
 pcst. e00 single-line tributaries
 pctc. e00 latitude longitude tics for this quadrangle
 vztc. e00 latitude longitude tics for index map
 pi directory containing Ciudad Piar and Ciudad Bolivar
 quadrangle files
 fnt040 ARC/INFO font file necessary for sag fault line symbol
 grid. e00 lat/long grid lines for index map
 import. aml ARC program for importing coverage
 index. e0* index map showing quadrangle names and surrounding
 countries, files 0-1

pi. aml ARC/PLOT program for 44" Versatec plotter
 pi. av ArcView 1 file
 pi. gra ARC/PLOT 1040 plot file for 44" Versatec plotter.
 This a binary file.

pianno5. e00 geographic place name annotation
 picor. e00 correlation of map units
 pift. e00 faults
 pige. e0* geology, 0-2
 pilab. e00 rock unit label annotation
 pileg. e00 map legend
 pilegpt. e00 map legend points
 pima. e00 buried magnetic bodies
 piout. e00 quadrangle outline and lat/long numbers
 pipl. e00 political boundaries
 pird. e00 roads
 piscale. e00 1: 500,000 scale bar, title, & citation
 pistr. e00 structural lines from SLAR
 pist. e00 single-line tributaries
 pitc. e00 latitude longitude tics for this quadrangle
 vztc. e00 latitude longitude tics for index map

se directory containing Santa Elena quadrangle files

grid. e00 lat/long grid lines for index map
 import. aml ARC program for importing coverage
 index. e0* index map showing quadrangle names and surrounding
 countries, files 0-1

se. aml ARC/PLOT program for 44" Versatec plotter
 se. av ArcView 1 file
 se. gra ARC/PLOT 1040 plot file for 44" Versatec plotter.
 This a binary file

seanno5. e00 geographic place name annotation
 secur. e00 correlation of map units
 seft. e00 faults
 sege. e0* geology, 0-1
 selab. e00 rock unit label annotation
 seleg. e00 map legend
 selegpt. e00 map legend points
 seout. e00 quadrangle outline and lat/long numbers
 sepl. e00 political boundaries
 serd. e00 roads
 sescal. e00 1: 500,000 scale bar, title, & citation
 sest. e00 single-line tributaries
 setc. e00 latitude longitude tics for this quadrangle
 vztc. e00 latitude longitude tics for index map

sf directory containing San Fernando quadrangle files

grid. e00 lat/long grid lines for index map
 import. aml ARC program for importing coverage
 index. e0* index map showing quadrangle names and surrounding
 countries, files 0-1

sf. aml ARC/PLOT program for 44" Versatec plotter
 sf. av ArcView 1 file
 sf. gra ARC/PLOT 1040 plot file for 44" Versatec plotter.
 This a binary file

sfanno5. e00 geographic place name annotation
 sfcor. e00 correlation of map units

| | |
|----------------|---|
| sfft. e00 | faults |
| sfge. e00 | geology |
| sflab. e00 | rock unit label annotation |
| sfleg. e00 | map legend |
| sflegpt. e00 | map legend points |
| sfout. e00 | quadrangle outline and lat/long numbers |
| sfpl. e00 | political boundaries |
| sfscale. e00 | 1: 500,000 scale bar, title, & citation |
| sfst. e00 | single-line tributaries |
| sftc. e00 | latitude longitude tics for this quadrangle |
| vztc. e00 | latitude longitude tics for index map |
| vz | directory containing export files for combined coverages |
| avmrk. e00 | ArcView markerset to be copied to the ARC HOME directory |
| avtxt. e00 | ArcView textset to be copied to the ARC HOME directory |
| deposit. e0* | mineral deposits, prospects and occurrences, files 0-2 |
| equi2geo. prj | projection file for converting equidistant conic to decimal degrees |
| fnt040 | ARC/INFO font file necessary for sag fault line symbol |
| ge. gra | ARC/PLOT 1040 plot file for 44" Versatec plotter. This a binary file |
| geo2equi. prj | projection file for converting decimal degrees to equidistant conic |
| grid. e00 | lat/long grid lines for index map |
| import. aml | ARC script for importing all coverages |
| index. e0* | index map showing quadrangle names and surrounding countries, files 0-1 |
| mrdsak. e00 | ARC/PLOT markerset for other point symbols |
| myalgeol. e00 | ARC/PLOT markerset for cities, bedding, joint symbols |
| myplotter. e00 | ARC/PLOT shadeset for geology patterns |
| myplt. e00 | ARC/PLOT lineset for faults, roads, political boundaries |
| places. e00 | geographic place names |
| ptpat. e00 | geology polygon lookup table, plotter patterns |
| ptpl. e00 | point symbol lookup table |
| pptype. e00 | geology polygon lookup table, Versatec colors |
| ra. e0* | mineral resource permissive areas map A |
| raanno. e00 | mineral resource permissive areas map A annotation |
| rb. e0* | mineral resource permissive areas map B files, 0-1 |
| rbanno. e00 | mineral resource permissive areas map B annotation |
| rbstruct. e00 | mineral resource permissive areas map B structural features |
| scale. e00 | scalebar and projection information |
| vz. aml | ARC/PLOT program for 44" Versatec plotter |
| vz. av | ArcView 1 view file |
| vz. apr | ArcView 3 project file |
| vzcor. e00 | correlation of map units |
| vzctry. e0* | Northeast South America country borders, 0-1 |
| vzft. e00 | faults, annotation, joints and bedding |
| vzge. e00 | geology files, 0-9 |
| vzlab. e0* | rock unit annotation and leaders files, 0-2 |
| vzline. e00 | lineset for Arc/Edit, Arc/Plot, Versatec plots |
| vzma. e00 | buried magnetic bodies |
| vzout. e00 | outer edge of combined quadrangles in study area |
| vzpl. e00 | study area political boundaries |
| vzprov. e00 | Venezuela province boundaries for index map |

vzrd. e00
vzst. e0*
vztc. e00

roads
single-line tributaries and annotation files, 0-2
latitude/longitude numbers and tics for index map

PROJECT OVERVIEW

Conversion of the Venezuela maps to a computerized digital format was undertaken for the following reasons:

1) The digital format facilitates the presentation and analysis of earth-science data. Digital maps can be displayed at any scale or projection, whereas a paper map has a fixed scale and projection. However, the maps on this disc are not intended to be used at any scale more detailed than 1:500,000.

A geographic information system (GIS) allows combining and overlaying of layers for analysis of spatial relations not readily apparent in the standard paper publication. Digital data on geology, geophysics, and geochemistry can be combined to create useful derivative products.

2) The digital format was used to facilitate publication in both paper and electronic form. For the Río Caura paper map publication (Brooks and others, 1995), digital images were sent to the Gerber plotter, a vector-to-film processor. The other 1:500,000-scale MF maps were reproduced photographically from electrostatic plotter output on clear mylar. The published digital formats include this CD-ROM and ARC/INFO Export files to be located on the World Wide Web on the Internet.

HISTORY OF THE MAPS

The data in this CD-ROM are based on a mineral resource assessment of the Venezuelan Guayana Shield, conducted between 1987 and 1991 by the U.S. Geological Survey and Corporación Venezolana de Guayana, Técnica Minera, (USGS, 1993). The Venezuelan Shield occupies about 415,000 sq km in the south and east part of Venezuela. The study area is bounded on the north by the Río Orinoco. It includes all of the Territorio Federal Amazonas, Estado Bolívar, and part of Estado Delta Amacuro. The original resource assessment publication USGS Bulletin 2062 consists of 121 pages of text and figures as well as eight full-color maps:

- Geographic
- Geologic and tectonic
- Bouguer gravity
- Two mineral-occurrence maps
- Side-looking airborne radar image
- Two permissive domain maps

The side-looking airborne radar image and the Bouguer gravity map are not included in this CD-ROM. The geology layer from the 1993 Bulletin was revised and published as a series of MF and I maps:

| Quadrangles | Map | Authors |
|----------------------------------|------------------|-----------------------------|
| Guri + Tucupita | MF- 2242 | Cox and others, 1993 |
| Ciudad Pi ar + Ciudad Bolívar | MF- 2246 | Stewart and others, 1994 |
| San Fernando de Apure | MF- 2247 | Stewart, 1994 |
| Santa Elena | unpublished data | Floyd Gray and others, 1995 |
| Río Caura | I- 2537 | Brooks and others, 1995 |
| Puerto Ayacucho | MF- 2245 | Wynn and others, 1994 |
| La Esmeralda | MF- 2244 | Wynn and others, 1994 |
| Atabapo | MF- 2240 | Wynn and others, 1994 |
| Río Mavaca | MF- 2241 | Wynn and others, 1994 |
| Piedra de Cocuy | MF- 2243 | Wynn and others, 1994 |

The digital map files on this CD-ROM were used to create the above publications. They subsequently underwent minor revisions to reconcile conflicting rock unit names and to view correctly in ArcView 1.

USGS BULLETIN 2062 TEXT AND FIGURES FILES

The text of the 1993 USGS Bulletin 2062 is available in several Framemaker, Rich Text Word, and TIF files on the CD-ROM. The text in the following files may vary slightly from the final publication. Some of the files listed below duplicate parts of each other but in different formats. The tif files were created by scanning the published Plates 2 and 6. Plate 2 is split into two files. The other Plates have not been scanned.

| file name | size Kb | format | content |
|----------------|------------|-------------------|------------------------------|
| b2062con. mi f | 154 | framemaker 3.0p1b | table of contents |
| b2062con. txt | 7.6 | text | table of contents |
| b2062con. rtf | 16 | rich text (RTF) | table of contents |
| b2062fnt. mi f | 134 | framemaker 3.0p1b | cover 1, cover 2, i, ii, iii |
| b2062fnt. txt | 3.4 | text | i, ii |
| b2062txt. mi f | 1208 | framemaker 3.0p1b | main body, p. 1-120 |
| b2062txt. txt | 251 | text | main body, p. 1-72 |
| b2062txt. rtf | 9.6 | rich text (RTF) | main body, p. 3-5 |
| tables. doc | 113 | Word 5.1 | tables 1-2, 4-11 |
| tabside. doc | 183 | Word 5.1 | table 3 |
| vzge. tif | 93000 | TIF | Plate 2, geologic map part |
| vzget. tif | 20000 | TIF | Plate 2, geology, key part |
| vzmin. tif | 87000 | TIF | Plate 6, mineral deposits |

REFERENCES FOR THIS DISC

- Bellizzia-G., Alirio, Pimentel-M., Nelly, and Bajo-O., R., 1976, Mapa geológico estructural de Venezuela: Ministerio de Minas e Hidrocarburos, Dirección Geológica, Caracas, Venezuela, scale 1:500,000.
- Briceño, H.O., 1982, Application of remote sensing to diamond placer exploration in a tropical jungle environment, Caroní River, Venezuela: Golden, Colo., Colorado School of Mines, Ph.D dissertation, 176 p.
- Brooks, W.E., Sidder, G.B., Wynn, J.C., Cox, D.P., Stewart, J.H., and Schruben, P.G., 1995, Geologic map of the Río Caura 2° by 3° quadrangle, estado Bolívar, Venezuela: U.S. Geological Survey Miscellaneous Investigations Map I-2537.
- Brooks, W.E., Tosdal, R.M., and Nuñez, F., in press, Gold resources of the Río Chivao study area, Estado Bolívar, Venezuela, in Sidder, G.B., García G., Andrés, and Stoesser, J.W., eds., Geology and mineral deposits of the Venezuelan Guayana Shield: U.S. Geological Survey Bulletin 2124.
- Cox, D.P., Gray, Floyd, Acosta, Juan, Stewart, J.H., Arespón, Jesús, Brooks, W.E., Franco, Luis, Salazar, Edixon, and Lopez, Yolanda, 1993, Geologic map of the Guri and southern part of the Tucupita 2°x3° quadrangles, Bolívar State, Venezuela: U.S. Geological Survey Miscellaneous Field Studies Map MF-2242, scale 1:500,000.
- Environmental Systems Research Institute, Inc., 1990, ARC/INFO 5.0 User Manuals: Redlands, Calif.
- Environmental Systems Research Institute, Inc., 1992, ArcView User's Guide: Redlands, Calif.
- Gaudette, H.E., Mendoza, Vicente, Hurley, P.M., and Fairbairn, H.W., 1978, Geology and age of the Parguaza rapakivi granite, Venezuela: Geological Society of America Bulletin, v. 89, p. 1335-1340.
- Gaudette, H.E., and Olszewski, W.J., Jr., 1985, Geochronology of the basement rocks, Amazonas Territory, Venezuela and the tectonic evolution of the western Guiana Shield: Geologie en Mijnbouw, v. 64, p. 131-143.
- Ghosh, S.K., 1985, Geology of the Roraima Group and its implications: Simposium Amazonico, 1st, Caracas, 1981; Ministerio de Energía y Minas, Dirección de Geología Boletín de Geología Publicación Especial 10, p. 31-50
- Green, G.N., and Selner, G.I., 1988, GSMARC--A program and procedure to convert GSMAP data bases into ARC/INFO coverages; GSDARC, a counterpart program for GSDRAW data bases and an ARC/INFO procedure to topologically structure resultant data: U.S. Geological Survey Open-File Report 88-430-A (16 p.) and B (a 5.25-inch diskette).

- Marcano, Iris, Lugo, Elis, and Rivero, Nelson, 1991, Geología y geomorfología de la frontera con Colombia, entre la Piedra de Cocuy y Maroa, al suroeste del Territorio Federal Amazonas, Venezuela: CVG-TECMIN Grupo Inventario internal report.
- Martínez, Felix, 1991, Mapa geológico del area Río Cunucunuma: Congreso Geológico de la Frontiera de Venezuela, San Cristobal, Venezuela, September 9-13, 1991.
- McCandless, G.C., 1962, Reconnaissance geology of the northwest region of the State of Bolívar, Venezuela: Caribbean Journal of Science, v. 2, no. 4, p. 145-155.
- Mendoza, Vicente, Moreno, L.A., Barrios, Fernando, Rivas, Duggar, Martínez, Jesús, Lira, Pedro, Sardi, Gustavo, and Ghosh, S.K., 1977, Geología de la parte norte del Territorio Federal Amazonas, Venezuela (informe en progreso): Congreso Geológico Venezolano, 5th, Caracas, 1977, Memoria, v.1, p. 363-404.
- Mendoza-S., Vicente, 1977, Evolución tectónica del Escudo de Guayana, in Petzall, C., ed., Memoria Segundo [II] Congreso Latinoamericano de Geología, Tomo III, Caracas, November 11-16, 1973: Venezuela, Dirección de Geología, Boletín de Geología, Publicación Especial 7, v. 3, p. 2237-2270.
- Reid, A.R., and Bisque, R.E., 1975, Stratigraphy of the diamond-bearing Roraima Group, Estado Bolívar, Venezuela: Colorado School of Mines Quarterly Bulletin, v. 70, no. 1, p. 61-82.
- Schruben, P.G., 1986, MRDS-REV, a mineral occurrence/deposit database for microcomputer: U.S. Geological Survey Open-File Report 86-34, 55 p.
- Schruben, P.G., 1995, Geology of the Venezuelan Guayana Shield at 1:500,000 scale--A digital representation of maps published by the U.S. Geological Survey: U.S. Geological Survey Open-File Report 95-493, 11 p. and a web page.
- Selner, G.I., and Taylor, R.B., 1987, GSDRAW and GSMAP version 4.0; prototype programs for the IBM PC and compatible microcomputers to assist compilation and publication of geologic maps and illustrations: U.S. Geological Survey Open-File Report 87-496-A (documentation, 90 p.), B (executable 5.25-inch diskette), C (source-code 5.25-inch diskette), and D (two executable utility program diskettes, each 5.25 inches).
- Sidder, G.B., and Mendoza-S., Vicente, 1991, Geology of the Venezuelan Guayana Shield and its relation to the entire Guayana Shield: U.S. Geological Survey Open-File Report 91-141, 59 p., 2 plates.
- Sidder, G.B., García G., Andrés, and Stoesser, J.W., eds., in press, Geology and mineral deposits of the Venezuelan Guayana Shield: U.S. Geological Survey Bulletin 2124.
- Soares, M.A., 1985, Estudio petrográfico de la estructura alcalina La Churuata, Territorio Federal Amazonas: Congreso Geológico Venezolano, 6th, Caracas, Memoria, v. 4, p. 2117-2158.

- Stewart, J.H., 1994, Geologic map of part of the San Fernando de Apure 2°x3° quadrangle, Venezuela: U.S. Geological Survey Miscellaneous field studies map MF-2247.
- Stewart, J.H., Martínez, Félix, and Brooks, W.E., 1994, Geologic map of the Ciudad Piar and part of the Ciudad Bolívar 2°x3° quadrangles, Bolívar State, Venezuela: U.S. Geological Survey Miscellaneous Field Studies Map MF-2246, scale 1:500,000.
- Teggin, D.E., Martínez, M., and Palacios, G., 1985, Un estudio preliminar de las diabasas del Estado Bolívar, Venezuela, in Espejo C., Aníbal, Ríos-F., J.H., Pimentel de Bellizzia, Nelly, and Pardo, A.S., eds., *Petrología, geoquímica, y geocronología*, VI Congreso Geológico Venezolano, Caracas, Memoria, v. 4, p. 2159-2206.
- U.S. Geological Survey, 1986, Digital line graphs from 1:24,000-scale maps: U.S. Geological Survey US GeoData Data Users Guide 1, 109 p.
- U.S. Geological Survey, 1987, Digital line graphs from 1:2,000,000-scale maps: U.S. Geological Survey US GeoData Data Users Guide 3, 71 p.
- U.S. Geological Survey, 1989, Digital line graphs from 1:100,000-scale maps: U.S. Geological Survey US GeoData Data Users Guide 2, 88 p.
- U.S. Geological Survey and Corporación Venezolana de Guayana, Técnica Minera, C.A., 1993, Geology and Mineral Resource Assessment of the Venezuelan Guayana Shield: U.S. Geological Survey, Bulletin 2062, 121 p. 8 plates.
- Wentworth, C.M., and Fitzgibbon, T.T., 1991, Alacarte user manual, version 1.0: U.S. Geological Survey Open-File Report 91-587-C, 267 p.
- Wynn, J.C., Olmore, S.D., Mendoza, Vicente, Martínez, Miguel, Rincón, Haydée, García, Andrés, Rivero, Nelson, Rendón, Inés, Marcano, Iris, Lugo, Elis, and Schruben, P.G., 1994, Geologic map of the Venezuela part of the Atabapo 2°x3° quadrangle, Amazonas Federal Territory, Venezuela: U.S. Geological Survey Miscellaneous Field Studies Map MF-2240, scale 1:500,000.
- Wynn, J.C., Olmore, S.D., Mendoza, Vicente, García, Andrés, Martínez, Miguel, and Schruben, P.G., 1994, Geologic map of the Venezuela part of the Río Mavaca 2°x3° quadrangle, Amazonas Federal Territory, Venezuela: U.S. Geological Survey Miscellaneous Field Studies Map MF-2241, scale 1:500,000.
- Wynn, J.C., Olmore, S.D., Mendoza, Vicente, García, Andrés, Martínez, Miguel, Tovar, Frank, Rendón, Inés, Rincón, Haydée, Martínez, Félix, Lugo, Elis, and Schruben, P.G., 1994, Geologic map of the Venezuela part of the La Esmeralda 2°x3° quadrangle, Amazonas Federal Territory, Venezuela: U.S. Geological Survey Miscellaneous Field Studies Map MF-2244, scale 1:500,000.
- Wynn, J.C., Olmore, S.D., Mendoza, Vicente, García, Andrés, Rendón, Inés, Estanga, Yasmin, Rincón, Haydée, Martínez, Félix, Lugo, Elis, Rivero, Nelson, and Schruben, P.G., 1994, Geologic map of the Venezuela part of the Puerto Ayacucho

2°x3° quadrangle, Amazonas Federal Territory, Venezuela: U.S. Geological Survey
Miscellaneous Field Studies Map MF-2245, scale 1:500,000.

Wynn, J.C., Olmore, S.D., Mendoza, Vicente, Rincón, Haydée, García, Andrés, Rivero,
Nelson, Rendón, Inés, Gray, Floyd, Marcano, Iris, Lugo, Elis, and Schruben, P.G.,
1994, Geologic map of the Venezuela part of the Piedra de Cocuy 2°x3°
quadrangle, Amazonas Federal Territory, Venezuela: U.S. Geological Survey
Miscellaneous Field Studies Map MF-2243, scale 1:500,000.

DIGITAL PRODUCTION TECHNIQUES

The linework for all the quadrangles was originally digitized by Jeff Wynn with GSMAP (Selner and Taylor, 1987), a USGS-authored map editing and publishing program. Conversion from GSMAP to ARC/INFO was accomplished with GSMARC (Green and Selner, 1988). The three northern quadrangles were later re-scanned on an Tektronix 4991 autovectorizing drum scanner by Paul Schruben from the geologists' revised drawings. The arcs and polygons were tagged in ARC/INFO and the oriented point symbols such as bedding and joint symbols were created with Alacarte (Wentworth and Fitzgibbon, 1991).

MAP PROJECTION

The map projection is Equidistant Conic with the following parameters for all quadrangles:

| | |
|---------------------------------|----------------------|
| Sphere | Clarke 1866 spheroid |
| 1st standard parallel | 9 0 0.000 |
| 2nd standard parallel | 4 0 0.000 |
| central meridian | -66 0 0.000 |
| latitude of projection's origin | 0 0 0.000 |
| false easting (meters) | 0.00000 |
| false northing (meters) | 0.00000 |

CAUTIONS RELATING TO USE OF THE MAPS

One of the advantages of digital maps is the ability to change the map scale. However, the users of this disc should respect the intentions of the authors and recognize certain limitations of digital maps. The Venezuelan MF series maps on this disc are intended to be used at a scale of 1:500,000; they are not intended to be used at a more detailed (larger) scale. A Venezuela 2°x3° degree quadrangle measures about 17 inches high by 26 inches wide at 1:500,000 scale.

The "quadrangle" maps in this publication cover somewhat more or less than 2°x3° depending on the specific map. For instance, the Guri map (Cox and others, 1993) contains all of the Guri quadrangle and the southern part of the Tucupita quadrangle. The entire study area in the southeast part of Venezuela, known as the Venezuelan Guayana Shield, is about 36 inches tall at 1:1 million scale, which is the published scale for Bulletin 2062 (USGS and Corporación Venezolana de Guayana, Técnica Minera, C.A., 1993).

Furthermore, the geologic map is primarily a bedrock map, which depicts geologic materials present beneath the soil or relatively thin mantles of surficial deposits, not necessarily the surficial materials themselves. Indeed, the study area contains so much surficial cover and standing water that much of the mapping was accomplished with geophysical methods as opposed to directly examining rock outcrops.

ONLINE FILES

Some of the files on this CD will be available on the internet at the following internet address:

<http://minerals.er.usgs.gov/vz/dds-46.html>

The page will also list any bugs and errors discovered in the CD-ROM after release.

GRAPHICS FORMATS AVAILABLE ON THE DISC

1) ARC/INFO Export

These coverages are used for spatial analysis, derivative products, and to-scale plots on the Versatec electrostatic plotter. Compatible with Environmental Systems Research Institute's ARC/INFO Version 6.1.2 or later. The files are simple text and should be transmitted in ASCII mode except for the *.gra plot files, which are binary.

2) ARC/INFO Graphics, Adobe Illustrator, Portable Document Format (PDF), and Postscript formats

The geologic map in ARC/INFO Graphics, Adobe Illustrator, PDF, and Postscript formats are located in directory "arcunix7/vz". All are derived from the ARC/INFO ".gra" file using the POSTSCRIPT command.

3) ArcView format

ArcView is an easy-to-use graphics display package by the authors of ARC/INFO. This CD-ROM contains ArcView coverages for both UNIX and Microsoft Windows 3.x. It also contains export files that can be copied to other ARC/INFO platforms and imported to ArcView. ArcView 1 keys are in the "arcunix6" directory. The ArcView 3 key for the "vz" directory is in the "arcunix7" directory.

4) U.S. Geological Survey Digital Line Graph (DLG) Optional format (U.S. Geological Survey, 1986, 1987, and 1989).

The DLG Optional format is a U.S. Geological Survey standard for storing topologically structured files. It results in a compact ASCII file that is compatible with a variety of graphics software. Only the geology, faults, and correlation chart layers were converted to this format. The polygons and arcs are tagged, but the text annotation is not present because the DLG conversion software does not support annotation.

5) Tagged image file format (TIFF)

The geologic map and mineral deposit maps from Bulletin 2062 were scanned on a color scanner and saved as TIFF files. The larger files are compressed under PKZIP.

ARCVIEW AND ARC/INFO FILES

These files are compatible with ArcView 1 and ARC/INFO Version 6.1.2 or later. The files are contained in 11 directories. Ten of those directories contain coverages for the individual quadrangle publications. The eleventh directory, "vz", contains the same information but in the form of a combined map with all the quadrangles tiled together into a single coverage. ArcView 1 keys are in the "arcunix6" directory. The ArcView 3 key for the "vz" directory is in the "arcunix7" directory. There are no ArcView 3 keys for the individual quadrangles.

The coverages for the individual quadrangles have the same features as the combined coverage. The only differences are in some of the file names. For instance, the place names and city points in the individual quadrangles are stored in files called "*anno5.e00" as opposed to "places.e00" for the combined coverage.

The 11 directory structure is repeated in each of three formats: export, raw UNIX, and PC ARCVIEW.

EXPORT FILES

The export files are stored in the "export" directory. The same export files are used for both ARCVIEW and ARC/INFO. Each directory contains an IMPORT.AML program which imports all the coverages, lookup tables, etc. The "vz" directory contains lookup tables and markersets necessary for plotting the individual quadrangles. Before launching ARCVIEW, the "av.mrk" and "av.txt" files should be copied to the ARCVIEW home directory, usually the root or login directory.

The directories containing the export files on the CD are actually ARC/INFO workspaces for UNIX. For other platforms it may be necessary to launch ARC/INFO, create each of the 11 workspaces and import the coverages from those new workspaces. For instance, for the "vz" directory:

```
arc
cw vz
q
cd vz
cp /pdd/dds46/export/vz/* .
arc
&r import
```

The directory structure on the CD is as follows:

```
export  main directory
at      Atabapo
ay      Puerto Ayacucho
ca      Río Caura
es      La Esmeralda
gu      Guri, Tucupita
ma      Río Mavaca
pc      Piedra de Cocuy
```

pi Ciudad Piar, Ciudad Bolivar
se Santa Elena
sf San Fernando de Apure
vz combined coverages. Also necessary to plot individual quads.

RAW UNIX COVERAGES:

The raw coverages are in directory "arcunix6" and "arcunix7". These can be copied to your UNIX machine with the following command:

```
cp -r /pdd/dds46/arcunix
```

PC ARCVIEW COVERAGES:

The PC ARCVIEW coverages are stored in directory "arcpc". These files were converted directly from the UNIX version with the C program PCWKSP.

RUNNING THE PLOT PROGRAMS

Each of the 11 directories contains a plot program for that area. The plot programs rely on lookup tables in the "vz" combined coverages directory. So the "vz" combined coverages directory should be copied or imported to hard disk before executing the plot program. The resulting .gra file was converted to PostScript .eps with the ARC POSTSCRIPT command. The polygon colors are for a Versatec plotter or display screen.

INSTALLING ARCVIEW 1

This section contains instructions for installing and launching ArcView 1 for Windows and launching instructions for ArcView 1 for UNIX.

Installation instructions for ArcView 1 for Microsoft Windows:

1) Please observe the following system requirements:

- 80386 or better CPU
- Math coprocessor recommended
- Windows 3.0 or higher but not Windows 95
- 4 Mb of RAM, 8 strongly recommended
- 15 Mb of disk space
- Super VGA graphics system, 256 colors, 640x480 pixels minimum, 1024x768 pixels strongly recommended
- Microsoft compatible mouse
- Windows-supported printer

2) Decide where you are going to put ArcView 1 on your hard drive. You must have 15 Mb of hard disk space.

3) Launch Windows. Launch the File Manager. Use the File Manager to find the CD-ROM drive and the \DDS46\ARCVIEW directory. Double-click on ARCVIEW.EXE. This starts the self-installing procedure. At the licensing agreement document select the File menu, Exit. ARCVIEW asks for a hard disk drive letter designation and a directory name to store the program. The default is \ARCVIEW1.

4) When the install finishes, ArcView will tell you to examine SETUP.TXT and use it to modify AUTOEXEC.BAT and CONFIG.SYS. Exit from Windows and use the following instructions modified from SETUP.TXT.

Add the following environment variables to the C:\AUTOEXEC.BAT file:

```
set AVHOME=c:\arcview1      (or wherever you decide to put it)
set PATH=%PATH%;%AVHOME%\bin (Add Arcview1's bin directory
                             to the path )
set HOME=c:\arcview1      (or wherever you decide to put it)
set TEMP=c:\temp          (Make sure the directory
                           exists. A RAM disk works the
                           best, i. e, TEMP=d:\. This
                           variable should already be
                           present if Windows has been
                           installed.)
```

Add the following line to the C:\CONFIG.SYS file:

```
FILES=65
```

Rename the original lineset. Copy the custom lineset from the DDS-46 CD- ROM.

```
CD C:\ARCVIEW1\SYMBOLS  
REN AV.LIN AV_ORIG.LIN  
COPY D:\DDS46\DATAFILE\AVPCCOV\AV.LIN
```

5) Launch Windows. Launch the File Manager again and copy the DDS46\ARCPC directory to your hard disk. This step is optional but ArcView runs very slowly if the coverages are located on the CD-ROM.

Double-click on the ArcView icon. Navigate the drive and directory menus to D:\DDS46\DATAFILE. Double-click on the COSTA.AV view. ArcView will ask to search for the GEOL coverage. Select "Yes". Navigate to the AVPCCOV folder and double-click on the GEOL file. The ArcView Teacher will automatically find the full path to the rest of the coverages and launch the view. Select the "File" menu, "Save As". Save the view so the next time you launch it, the path will be remembered.

USING ARCVIEW 1

The CD-ROM includes coverages that can be displayed with ArcView 1 (Environmental Systems Research Institute, Inc., 1992). ArcView is an easy-to-use graphics display package by the authors of ARC/INFO. ArcView displays the same coverages and images as ARC/INFO. ArcView 1 is available for both UNIX and Microsoft Windows 3.x computers. This CD-ROM contains ArcView for Windows 3.x programs but not ArcView for UNIX programs. It does, however, contain coverages and views for both types of computers.

See "Installing ArcView 1" for instructions on installing and launching ArcView 1. After ArcView is launched, the Table of Contents or map key appears on the left and the map on the right. ArcView has a time-saving feature called interruptible re-draw. This means that the tools, menu items and themes in the Table of Contents are selectable even while ArcView is re-drawing the map. A mouse-click or mouse-drag will interrupt the drawing and take effect within a few seconds. There is no need to wait for complicated maps to finish drawing if you already know what you want to do next.

The initial width of the Table of Contents is too narrow to see all the text in the key. The width can be increased by dragging on the edge of the table with the mouse. Increasing the width of the Table of Contents causes it to overlap the map, but the map can be brought to the foreground by clicking on its title bar or edge.

The individual layers (data themes) in the Table of Contents are turned on and off in the display by selecting the checkboxes along the left side of the map key. Legends below individual themes can be turned on and off by dragging on the triangle on the right side of the key. Colors of points, lines, and polygon fill can be changed by double-clicking a theme, selecting the legend checkbox in the Properties dialog, then double-clicking on the color.

Zooming in and out are accomplished in many ways in ArcView. One way is to select a theme or themes by single-clicking on the items in the Table of Contents so they appear slightly raised. Single-click again to de-select them. Choose just the items you want to zoom to, then select the "fit-selected-features-to-window" icon, which is the second icon from the left in the map window. It looks like a down arrow over a stack of paper. For instance, the "Venezuela national boundary" theme will give the widest view, "Index map" the next widest, "Geology, all quadrangles" the next widest, and individual quadrangles the smallest. In each quadrangle, the Scale bar theme zooms out to see all the text and map. This is the default selection as the CD is shipped.

Another way to zoom in is with the "zoom-to-a-box" tool on the tool palette. The tool palette can be brought to the foreground with the "Windows" menu, "Tools..." item. Just select the dashed-line-box tool, which is the second from the bottom on the left, then drag in a diagonal movement across the area you wish to zoom to.

If you view the "Rock unit names" theme, be sure to turn on the "Rock unit name leaders" as well. Otherwise some unit names appear to float in the wrong unit.

The order of layers in the Table of Contents is critical. All layers are opaque, and the color-fill polygons obscure everything beneath them. For this reason, color-fill themes are positioned lowest on the key and duplicated as non-filled versions higher up in the key. For instance, "Geology polygons" is low in the Table of Contents because it obscures everything beneath it. There is also a non-filled version called "Geology arcs" higher up in the key. Should it be necessary to change the order of

items in the Table of Contents, they can be dragged to a new position with the mouse. For instance, "Index map, colored countries" is positioned fairly high in the key for a color-fill theme. To draw geology outlines on top of it, just drag the index map theme to a position below the geology outlines theme.

To create hard copy of the ArcView 1 graphics screen, select the camera icon on the main display screen. This creates an encapsulated PostScript (EPS) file of the display image, which can be printed with standard commercial graphics software.

Use the "File" menu, "Open..." item to select other views:

| Area | file name |
|--|-----------|
| ----- | |
| Venezuelan Guayana Shield, all quadrangles | vz. av |
| Guri and southern part of the Tucupita 2°x3° quadrangles | gu. av |
| Ciudad Piar and part of the Ciudad Bolivar 2°x3° quadrangles | pi. av |
| San Fernando de Apure 2°x3° quadrangle (Bolivar part) | sf. av |
| Santa Elena 2°x3° quadrangle (Venezuela part) | se. av |
| Río Caura 2° by 3° quadrangle | ca. av |
| Puerto Ayacucho 2°x3° quadrangle (Venezuela part) | ay. av |
| La Esmeralda 2°x3° quadrangle (Venezuela part) | es. av |
| Atabapo 2°x3° quadrangle (Venezuela part) | at. av |
| Río Mavaca 2°x3° quadrangle (Venezuela part) | ma. av |
| Piedra de Cocuy 2°x3° quadrangle (Venezuela part) | pc. av |

ARCVIEW 1 FILES

The following table shows the ArcView table of contents items and the coverages they are drawn from:

| ArcView views and themes | file name |
|---|-----------|
| Venezuelan Guayana Shield, all quadrangles | vz. av |
| Venezuela national boundary | vzctry |
| Venezuela province boundary | vzprov |
| Scale bar annotation | scale |
| Scale bar | scale |
| Place names | places |
| Place points | places |
| Roads | vzrd |
| Outer quad outline | vzout |
| Outer quad outline, lat/long numbers | vzout |
| Latitude/longitude ticks | vztc |
| Index map annotation | index |
| Index map lat/long grid only | grid |
| Index map, colored countries, lat/long grid | index |
| Streams annotation | vzst |
| Streams | vzst |
| Mineral deposits | deposit |
| Linear features annotation | vzft |
| Linear features | vzft |
| A. Permissive domains annotation | raanno |
| A. Permissive domains leaders | raanno |
| A. Permissive domains for selected Fe, Au, Sn, Cu deposits | ra |
| A. Permissive domains poly arcs only | ra |
| B. Permissive domains structure annotation | rbstruct |
| B. Permissive domains structure lines | rbstruct |
| B. Permissive domains annotation | rbanno |
| B. Permissive domains leaders | rbanno |
| B. Permissive domains for selected Pb-Zn, Ni-Cu, diamond, kaolin deposits | rb |
| B. Permissive domains poly arcs only | rb |
| Correlation of map units annotation | vzcor |
| Correlation of map units polygons | vzcor |
| Buried magnetic bodies | vzma |
| Rock unit labels | vzlab |
| Rock unit labels leaders | vzlab |
| Geology arcs | vzge |
| Geology polygons | vzge |
| Guri and southern part of the Tucupita 2°x3° quadrangles | gu. av |
| Index map, latitude/longitude ticks | vztc |

| | |
|---|----------|
| Index map, annotation | index |
| Index map, lat/long grid only | grid |
| Index map, colored countries, lat/long grid | index |
| Guri, quadrangle lat/long tics | gutc |
| Guri, quadrangle lat/long numbers | guout |
| Guri, quadrangle outline | guout |
| Guri, place name annotation | guanno5 |
| Guri, city points | guanno5 |
| Guri, roads | gurd |
| Guri, province boundary | gupl |
| Guri, streams annotation | gust |
| Guri, streams | gust |
| Guri, linear feature annotation | guft |
| Guri, linear features | guft |
| Guri, correlation of map units annotation | gucor |
| Guri, correlation of map units polygons | gucor |
| Guri, map key annotation | gul eg |
| Guri, map key points | gul egpt |
| Guri, map key arcs | gul eg |
| Guri, map key polygons | gul eg |
| Guri, scale bar annotation | guscal e |
| Guri, scale bar | guscal e |
| Guri, rock unit labels | gul ab |
| Guri, rock unit labels leaders | gul ab |
| Guri, geology arcs | guge |
| Guri, geology polygons | guge |

| | |
|---|--------|
| Ciudad Piar and part of the Ciudad Bolivar 2°x3° quadrangles | pi. av |
|---|--------|

| | |
|--|-----------|
| Index map, latitude/longitude tics | vztc |
| Index map, annotation | index |
| Index map, lat/long grid only | grid |
| Index map, colored countries, lat/long grid | index |
| Ciudad Piar, quadrangle lat/long tics | pi tc |
| Ciudad Piar, quadrangle lat/long numbers | pi out |
| Ciudad Piar, quadrangle outline | pi out |
| Ciudad Piar, place name annotation | pi anno5 |
| Ciudad Piar, city points | pi anno5 |
| Ciudad Piar, roads | pi rd |
| Ciudad Piar, province boundary | pi pl |
| Ciudad Piar, streams annotation | pi st |
| Ciudad Piar, streams | pi st |
| Ciudad Piar, linear feature annotation | pi ft |
| Ciudad Piar, linear features | pi ft |
| Ciudad Piar, structural trends from SLAR | pi sr |
| Ciudad Piar, correlation of map units annotation | pi cor |
| Ciudad Piar, correlation of map units polygons | pi cor |
| Ciudad Piar, map key annotation | pi leg |
| Ciudad Piar, map key points | pi legpt |
| Ciudad Piar, map key arcs | pi leg |
| Ciudad Piar, map key polygons | pi leg |
| Ciudad Piar, scale bar annotation | pi scal e |

| | |
|---|----------|
| Ciudad Pi ar, scale bar | pi scale |
| Ciudad Pi ar, rock unit labels | pi lab |
| Ciudad Pi ar, rock unit labels leaders | pi lab |
| Ciudad Pi ar, kimberlite area annotation | pi ma |
| Ciudad Pi ar, kimberlite area | pi ma |
| Ciudad Pi ar, geology arcs | pi ge |
| Ciudad Pi ar, geology polygons | pi ge |
| | |
| San Fernando de Apure 2°x3° quadrangle (Bolivar part) | sf. av |
| | |
| Index map, latitude/longitude tics | vztc |
| Index map, annotation | index |
| Index map, lat/long grid only | grid |
| Index map, colored countries, lat/long grid | index |
| San Fernando, quadrangle lat/long tics | sftc |
| San Fernando, quadrangle lat/long numbers | sfout |
| San Fernando, quadrangle outline | sfout |
| San Fernando, place name annotation | sfanno5 |
| San Fernando, city points | sfanno5 |
| San Fernando, province boundary | sfpl |
| San Fernando, streams annotation | sfst |
| San Fernando, streams | sfst |
| San Fernando, linear features | sfst |
| San Fernando, correlation of map units annotation | sfcor |
| San Fernando, correlation of map units polygons | sfcor |
| San Fernando, map key annotation | sfleg |
| San Fernando, map key points | sflegpt |
| San Fernando, map key arcs | sfleg |
| San Fernando, map key polygons | sfleg |
| San Fernando, scale bar annotation | sfscale |
| San Fernando, scale bar | sfscale |
| San Fernando, rock unit labels | sflab |
| San Fernando, rock unit label leaders | sflab |
| San Fernando, geology arcs | sfge |
| San Fernando, geology polygons | sfge |
| | |
| Santa Elena 2°x3° quadrangle (Venezuela part) | se. av |
| | |
| Index map, latitude/longitude tics | vztc |
| Index map, annotation | index |
| Index map, lat/long grid only | grid |
| Index map, colored countries, lat/long grid | index |
| Santa Elena, quadrangle lat/long tics | setc |
| Santa Elena, quadrangle lat/long numbers | seout |
| Santa Elena, quadrangle outline | seout |
| Santa Elena, place name annotation | seanno5 |
| Santa Elena, city points | seanno5 |
| Santa Elena, roads | serd |
| Santa Elena, province boundary | sepl |
| Santa Elena, stream annotation | sest |
| Santa Elena, streams | sest |
| Santa Elena, linear feature annotation | seft |

| | |
|--|----------|
| Santa Elena, linear features | seft |
| Santa Elena, correlation of map units annotation | secor |
| Santa Elena, correlation of map units polygons | secor |
| Santa Elena, map key annotation | sel eg |
| Santa Elena, map key points | sel egpt |
| Santa Elena, map key arcs | sel eg |
| Santa Elena, map key polygons | sel eg |
| Santa Elena, scale bar annotation | sescal e |
| Santa Elena, scale bar | sescal e |
| Santa Elena, rock unit labels | sel ab |
| Santa Elena, rock unit labels leaders | sel ab |
| Santa Elena, geology arcs | sege |
| Santa Elena, geology polygons | sege |

| | |
|-------------------------------|--------|
| Río Caura 2° by 3° quadrangle | ca. av |
|-------------------------------|--------|

| | |
|--|----------|
| Index map, latitude/longitude tics | vztc |
| Index map, annotation | i ndex |
| Index map, lat/long grid only | grid |
| Index map, colored countries, lat/long grid | i ndex |
| Río Caura, quadrangle lat/long tics | catc |
| Río Caura, quadrangle lat/long numbers | caout |
| Río Caura, quadrangle outline | caout |
| Río Caura, place name annotation | caanno5 |
| Río Caura, city points | caanno5 |
| Río Caura, province boundary | capl |
| Río Caura, stream annotation | cast |
| Río Caura, streams | cast |
| Río Caura, linear features annotation | caft |
| Río Caura, linear features | caft |
| Río Caura, correlation of map units annotation | cacor |
| Río Caura, correlation of map units polygons | cacor |
| Río Caura, map key annotation | cal eg |
| Río Caura, map key points | cal egpt |
| Río Caura, map key arcs | cal eg |
| Río Caura, map key magnetics | cal eg |
| Río Caura, map key polygons | cal eg |
| Río Caura, scale bar annotation | cascal e |
| Río Caura, scale bar | cascal e |
| Río Caura, rock unit labels | cal ab |
| Río Caura, rock unit labels leaders | cal ab |
| Río Caura, buried magnetic bodies | cama |
| Río Caura, geology arcs | cage |
| Río Caura, geology polygons | cage |

| | |
|---|--------|
| Puerto Ayacucho 2°x3° quadrangle (Venezuela part) | ay. av |
|---|--------|

| | |
|---|--------|
| Index map, latitude/longitude tics | vztc |
| Index map, annotation | i ndex |
| Index map, lat/long grid only | grid |
| Index map, colored countries, lat/long grid | i ndex |
| Puerto Ayacucho, quadrangle lat/long tics | aytc |

| | |
|--|---------|
| Puerto Ayacucho, quadrangle lat/long numbers | ayout |
| Puerto Ayacucho, quadrangle outline | ayout |
| Puerto Ayacucho, place name annotation | ayanno5 |
| Puerto Ayacucho, city points | ayanno5 |
| Puerto Ayacucho, roads | ayrd |
| Puerto Ayacucho, province boundary | aypl |
| Puerto Ayacucho, streams annotation | ayst |
| Puerto Ayacucho, streams | ayst |
| Puerto Ayacucho, linear features | ayft |
| Puerto Ayacucho, correlation of map units annotation | aycor |
| Puerto Ayacucho, correlation of map units polygons | aycor |
| Puerto Ayacucho, map key annotation | ayleg |
| Puerto Ayacucho, map key points | aylegpt |
| Puerto Ayacucho, map key arcs | ayleg |
| Puerto Ayacucho, map key magnetics | ayleg |
| Puerto Ayacucho, map key polygons | ayleg |
| Puerto Ayacucho, scale bar annotation | ayscale |
| Puerto Ayacucho, scale bar | ayscale |
| Puerto Ayacucho, rock unit labels | aylab |
| Puerto Ayacucho, rock unit labels leaders | aylab |
| Puerto Ayacucho, section line annotation | aylabcr |
| Puerto Ayacucho, section line on map | aylabcr |
| Puerto Ayacucho, section annotation | aycrm |
| Puerto Ayacucho, section leaders | aycrm |
| Puerto Ayacucho, section geology arcs | aycrm |
| Puerto Ayacucho, section geology polygons | aycrm |
| Puerto Ayacucho, buried mag annotation | aymalab |
| Puerto Ayacucho, buried mag leaders | aymalab |
| Puerto Ayacucho, buried magnetic bodies | ayma |
| Puerto Ayacucho, geology arcs | ayge |
| Puerto Ayacucho, geology polygons | ayge |

| | |
|--|--------|
| La Esmeralda 2°x3° quadrangle (Venezuela part) | es. av |
|--|--------|

| | |
|---|---------|
| Index map, latitude/longitude tics | vztc |
| Index map, annotation | index |
| Index map, lat/long grid only | grid |
| Index map, colored countries, lat/long grid | index |
| La Esmeralda, quadrangle lat/long numbers | esout |
| La Esmeralda, quadrangle outline | esout |
| La Esmeralda, place name annotation | esanno5 |
| La Esmeralda, city points | esanno5 |
| La Esmeralda, province boundary | espl |
| La Esmeralda, streams annotation | esst |
| La Esmeralda, streams | esst |
| La Esmeralda, linear features | esft |
| La Esmeralda, structural trends from SLAR | essr |
| La Esmeralda, correlation of map units annotation | escor |
| La Esmeralda, correlation of map units polygons | escor |
| La Esmeralda, map key annotation | esleg |
| La Esmeralda, map key points | eslegpt |
| La Esmeralda, map key arcs | esleg |
| La Esmeralda, map key polygons | esleg |

| | |
|--|-------|
| La Esmeralda, rock unit labels | eslab |
| La Esmeralda, rock unit labels leaders | eslab |
| La Esmeralda, buried magnetic bodies | esma |
| La Esmeralda, geology arcs | esge |
| La Esmeralda, geology polygons | esge |

| | |
|---|--------|
| Atabapo 2°x3° quadrangle (Venezuela part) | at. av |
|---|--------|

| | |
|--|---------|
| Index map, latitude/longitude tics | vztc |
| Index map, annotation | index |
| Index map, lat/long grid only | grid |
| Index map, colored countries, lat/long grid | index |
| Atabapo, quadrangle lat/long numbers | atout |
| Atabapo, quadrangle outline | atout |
| Atabapo, place name annotation | atanno5 |
| Atabapo, swamp symbols | atanno5 |
| Atabapo, province boundary | atpl |
| Atabapo, streams annotation | atst |
| Atabapo, streams | atst |
| Atabapo, linear features | atft |
| Atabapo, correlation of map units annotation | atcor |
| Atabapo, correlation of map units polygons | atcor |
| Atabapo, map key annotation | atleg |
| Atabapo, map key arcs | atleg |
| Atabapo, map key magnetics | atleg |
| Atabapo, map key polygons | atleg |
| Atabapo, scale bar annotation | atscale |
| Atabapo, scale bar | atscale |
| Atabapo, rock unit labels | atlab |
| Atabapo, rock unit labels leaders | atlab |
| Atabapo, buried magnetic bodies | atma |
| Atabapo, geology arcs | atge |
| Atabapo, geology polygons | atge |

| | |
|--|--------|
| Río Mavaca 2°x3° quadrangle (Venezuela part) | ma. av |
|--|--------|

| | |
|---|---------|
| Index map, latitude/longitude tics | vztc |
| Index map, annotation | index |
| Index map, lat/long grid only | grid |
| Index map, colored countries, lat/long grid | index |
| Río Mavaca, quadrangle lat/long numbers | maout |
| Río Mavaca, quadrangle outline | maout |
| Río Mavaca, place name annotation | maanno5 |
| Río Mavaca, city points | maanno5 |
| Río Mavaca, streams annotation | mast |
| Río Mavaca, streams | mast |
| Río Mavaca, linear features | maft |
| Río Mavaca, correlation of map units annotation | macor |
| Río Mavaca, correlation of map units polygons | macor |
| Río Mavaca, map key annotation | mal eg |
| Río Mavaca, map key arcs | mal eg |
| Río Mavaca, map key magnetics | mal eg |

| | |
|--|----------|
| Río Mavaca, map key polygons | mal eg |
| Río Mavaca, scale bar annotation | mascale |
| Río Mavaca, scale bar | mascale |
| Río Mavaca, rock unit labels | mal ab |
| Río Mavaca, rock unit labels leaders | mal ab |
| Río Mavaca, geology arcs | mage |
| Río Mavaca, buried magnetic bodies | mama |
| Río Mavaca, geology polygons | mage |
| | |
| Piedra de Cocuy 2°x3° quadrangle (Venezuela part) | pc. av |
| | |
| Index map, latitude/longitudes | vztc |
| Index map, annotation | index |
| Index map, lat/long grid only | grid |
| Index map, colored countries, lat/long grid | index |
| Piedra de Cocuy, quadrangle lat/long numbers | pcout |
| Piedra de Cocuy, quadrangle outline | pcout |
| Piedra de Cocuy, place name annotation | pcanno5 |
| Piedra de Cocuy, city points | pcanno5 |
| Piedra de Cocuy, province boundary | pcpl |
| Piedra de Cocuy, streams annotation | pcst |
| Piedra de Cocuy, streams | pcst |
| Piedra de Cocuy, linear features | pcft |
| Piedra de Cocuy, structural trends from SLAR | pcsr |
| Piedra de Cocuy, correlation of map units annotation | pccor |
| Piedra de Cocuy, correlation of map units polygons | pccor |
| Piedra de Cocuy, map key annotation | pcl eg |
| Piedra de Cocuy, map key points | pcl egpt |
| Piedra de Cocuy, map key arcs | pcl eg |
| Piedra de Cocuy, map key magnetics | pcl eg |
| Piedra de Cocuy, map key polygons | pcl eg |
| Piedra de Cocuy, scale bar annotation | pcscale |
| Piedra de Cocuy, scale bar | pcscale |
| Piedra de Cocuy, rock unit labels | pcl ab |
| Piedra de Cocuy, rock unit labels leaders | pcl ab |
| Piedra de Cocuy, geology arcs | pcge |
| Piedra de Cocuy, buried magnetic bodies | pcma |
| Piedra de Cocuy, geology polygons | pcge |

ARCVIEW 3 FILES

The ArcView 1 view for the entire study area, "vz.av", has been converted to ArcView 3 format, "vz.apr". It is in "arcunix7/vz" directory. The coverages are in ARC/INFO 7 format so are useable on Mac, PC and UNIX platforms.

The first time you launch the vz.apr project on your computer the ArcView Open Project dialog will ask where the first coverage is located. On the Macintosh, Arcview 3 can install the paths for all the coverages if the user locates the first coverage in the Open Project dialog. Just navigate to the arcunix7/vz/info directory.

On Windows and UNIX platforms it is best use a word processor and global substitute the correct path in the vz.apr file. Search for all lines that have the key word "Path:" and replace the long UNIX path with your path. For instance:

```
/home10b/resdgs2/pschruben/arc/vz2/cd/arcview.dat/unix
```

change to:

```
d:/arcunix7
```

Yes, ArcView likes forward slashes in the project file.

COVERAGE DATA DEFINITION

GEOLOGY POLYGON ATTRIBUTES:

The ARC/INFO VZGE.PAT file consists of:

| COLUMN | ITEM NAME | WIDTH | OUTPUT | TYPE | INDEXED? |
|--------|-----------|-------|--------|------|-------------------------------|
| 1 | AREA | 4 | 12 | F | |
| 5 | PERIMETER | 4 | 12 | F | |
| 9 | VZGE# | 4 | 5 | B | |
| 13 | VZGE-ID | 4 | 5 | B | |
| 17 | FMATN | 6 | 6 | C | upper-case rock-unit code |
| 23 | PTYPEI | 3 | 3 | C | for sorting units into groups |
| 26 | LC | 6 | 6 | C | mixed-case rock-unit code |
| 32 | DESC | 60 | 60 | C | |
| 92 | PTYPES | 69 | 69 | C | |

PTYPEI is a two-digit integer that is used to sort the units into groups of related rocks. The third character in PTYPEI is a space for appearance in the legend. PTYPES is composed of PTYPEI, PTYPE, and DESC. It also can be used to sort correctly by unit group. All the short rock descriptions are in the INFO file DESC in alphabetical order (abbreviations: Fm, Formation; gr, grained; Gp Group; E, Early; Prot, Proterozoic; rx, rocks; Plio, Pliocene; qtz, quartz; Sg, Supergroup; congl, conglomerate; qtzite, quartzite; Mid, Middle; terr, terrane; sed, sedimentary rocks; metaseds, metasedimentary rocks):

| | |
|--------|--|
| LC | DESC |
| blank | Unmapped area |
| d | Diabase - mafic dikes undivided (Mesozoic to M Proterozoic) |
| diorit | Fenitized diorite & tonalite at Cerro Impacto |
| ic | Carbonatite(?) intrusion of Cerro Impacto |
| Qal | Alluvial deposits of sand, gravel, and silt (Quaternary) |
| QTm | Mesa Fm. siltstone and sandy siltstone (Pleistocene & Plio) |
| water | |
| Xa | Amphibolite schist containing andesine (E Prot) |
| XAgr | Granitic rx of Imataca Complex (E Prot and/or Archean) |
| XAi | Imataca Complex orthogneiss and paragneiss (Archean) |
| XAm | Migmatite & gneiss of Imataca Complex (E Prot or Archean) |
| Xbc | Basement complex granite to granodiorite gneiss (E Prot) |
| Xcb | Caballape Fm felsic metatuff and phyllite (E Prot) |
| Xcc | Cicapra Fm (Carichapo Gp) mafic to intermed metatuff E Prot |
| Xce | El Callao Fm (Carichapo Gp) greenstone, greenschist (E Prot) |
| Xcg | Granitic rocks of Cuchivero Group (Early Proterozoic) |
| Xco | Cinaruco Fm qtzite, sericitic qtzite, schist (E Prot) |
| Xcv | Caicara Fm (Cuchivero Gp) rhyodacitic-rhyolitic tuff E Prot |
| Xf1 | Felsic metatuff and flows (Early Proterozoic) |
| Xf2 | Felsic metatuff and flows, eugeosynclinal terrane (E Prot) |
| Xg | Calc-alkaline granite & other silicic plutonic rx (E Prot) |
| Xg1 | Metagabbro (greenstone belts) (Early Proterozoic) |
| Xg2 | Metagabbro (eugeosynclinal terrane) (Early Proterozoic) |
| Xgr | Granitic rocks, mostly quartz monzonite (Early Proterozoic) |

Xgu Granitic silicic to intermediate intrusive rocks (E Prot)
 Xlc Los Caribes Fm arkose, polymict congl, phyllite (E Prot)
 Xm1 Meta-mafic to intermediate flow and pyroclastic rx (E Prot)
 Xm2 Mafic to intermediate metalava and metatuff (E Proterozoic)
 Xma Maracapa Fm red beds, felsic volcanics (E Proterozoic)
 Xmo Moriche Fm metasedimentary conglomerates (E Prot)
 Xmp Intrusive rx of San Carlos metamorphic-plut terrane (E Prot)
 Xmu Greenstone belt rocks, undivided (Early Proterozoic)
 Xpr Pre-Roraima Gp sedimentary rx clay-rich sandstone (E Prot)
 Xs1 Schist, phyllite, metatuffs, and metavolcanic rx (E Prot)
 Xs2 Muscovite schist and phyllite, eugeosynclinal terr (E Prot)
 Xsm Seds and metaseds of uncertain affinity qtz arenite (E Prot)
 Xsp Supamo Complex sodic granitic rx, paragneiss, etc. (E Prot)
 Xu1 Metaperidotite, metapyroxenite, serp & talc schist (E Prot)
 Xu2 Ultramafic rx metaperidotite, metapyroxenite, etc. (E Prot)
 Xui Ultramafic intrusive rx in La Flor-Carapo area (E Prot)
 Xyf Yuruari Fm (Pastora Sg) felsic metatuff (E Prot)
 Xys Yuruari Fm Pastora Sg qtz muscovite schist, phyllite E Prot
 Ylg Late granite intrusive in, and doming Roraima seds (M Prot)
 Yp Parguaza granite, massive, porphyritic & biotite (M Prot)
 YXac Alkaline intrusive complexes (Middle to Early Proterozoic)
 YXr Roraima Group (undivided) qtz arenite, arkose M &/or E Prot
 YXra Auyantepuy Fm (Roraima Gp) quartz arenite, arkose M, E Prot
 YXrc Canaima Fm (Roraima Gp) qtz arenite, arkose, etc. M, E Prot
 YXrg Guaiquinima Fm (Roraima Gp) qtz arenite, arkose M, E Prot

GEOLOGY ARC TYPES:

The VZGE.AAT items are:

| COLUMN | ITEM NAME | WIDTH | OUTPUT | TYPE |
|--------|-----------|-------|--------|------|
| 1 | FNODE# | 4 | 5 | B |
| 5 | TNODE# | 4 | 5 | B |
| 9 | LPOLY# | 4 | 5 | B |
| 13 | RPOLY# | 4 | 5 | B |
| 17 | LENGTH | 4 | 12 | F |
| 21 | VZGE# | 4 | 5 | B |
| 25 | VZGE-ID | 4 | 5 | B |
| 29 | CODE | 3 | 3 | I |
| 32 | P1 | 3 | 3 | I |
| 35 | P2 | 3 | 3 | I |

| CODE | DESC |
|------|---------------------------|
| 1 | international boundary |
| 2 | surface water body |
| 30 | geological contact |
| 32 | geological contact hidden |

FAULT ARCS:

The VZFT.AAT attribute table contains:

| COLUMN | ITEM NAME | WIDTH | OUTPUT | TYPE | INDEXED? |
|--------|-----------|-------|--------|------|----------|
| 1 | FNODE# | 4 | 5 | B | |
| 5 | TNODE# | 4 | 5 | B | |
| 9 | LPOLY# | 4 | 5 | B | |
| 13 | RPOLY# | 4 | 5 | B | |
| 17 | LENGTH | 4 | 12 | F | |
| 21 | VZFT# | 4 | 5 | B | |
| 25 | VZFT-ID | 4 | 5 | B | |
| 29 | CODE | 3 | 3 | I | |
| 32 | FTYPEI | 3 | 3 | C | |
| 35 | DESC | 60 | 60 | C | |
| 95 | FTYPES | 63 | 63 | C | |

CODES AND DESCRIPTIONS FOR FAULTS AND OTHER COVERAGES:

The INFO file FTYPE contains:

| CODE | FTYPEI | DESC |
|------|--------|--------------------------------|
| 20 | 1 | fault |
| 6 | 2 | fault - inferred (dashed) |
| 7 | 3 | fault - implied (dotted) |
| 79 | 4 | thrust fault |
| 127 | 5 | sag fault |
| 17 | 6 | fold axis |
| 21 | 7 | graben |
| 26 | 8 | graben - hidden |
| 25 | 9 | shear zone |
| 72 | 10 | U or Th anomaly |
| 81 | 11 | structural trend |
| 70 | 12 | ring structure |
| 103 | 13 | iron formations |
| 18 | 14 | major magnetic gradient |
| 16 | 15 | fault movement and fold arrows |
| 1 | 16 | international boundary |
| 4 | 17 | province boundary |
| 2 | 18 | surface water body |
| 3 | 18 | tributary |
| 5 | 19 | main road |
| 42 | 20 | secondary road |
| 30 | 21 | geological contact |
| 32 | 22 | geological contact hidden |

PERMISSIVE TRACT POLYGONS:

The RA.PAT and RB.PAT polygon attribute files contain:

| COL | ITEM NAME | WDTH | OPUT | TYP |
|-----|-----------|------|------|-----|
| 1 | AREA | 4 | 12 | F |
| 5 | PERIMETER | 4 | 12 | F |
| 9 | RA# | 4 | 5 | B |

| | | | | |
|----|-------|----|----|---|
| 13 | RA-ID | 4 | 5 | B |
| 17 | FMATN | 6 | 6 | C |
| 23 | TRACT | 5 | 5 | C |
| 28 | DESC | 64 | 64 | C |
| 92 | KEY | 69 | 69 | C |

TRACT MAP A

KEY

- IIa Low-sulfide gold-quartz vein deposits, permissive
- IIb Low-sulfide gold-quartz vein deposits, low probability
- Ia Algoma iron and sedimentary manganese deposits, permissive
- Ib Algoma iron and sedimentary manganese deposits, low probability
- VI Tin greisen deposits
- VIII Porphyry copper and volcanic-hosted magnetite deposits

TRACT MAP B

KEY

- III Kuroko-type massive sulfide deposits
- IV Synorogenic-synvolcanic Ni-Cu & related platinum deposits
- V Carbonatite deposits and diamond-bearing kimberlite pipes
- VII Sedimentary kaolin deposits

MINERAL DEPOSIT POINTS:

The original list of mineral deposits in Bulletin 2062 (USGS and Corporación Venezolana de Guayana, Técnica Minera, C.A., 1993) was not available in digital form at the time of publication of this CD-ROM. Consequently, a new retrieval was made from the USGS Mineral Resources Data System (Schruben, 1986). This also takes advantage of any updates that may have taken place in the data base. The retrieval netted 2353 deposits in Venezuela, Guayana, Surinam, French Guinea, and Brazil, of which 459 deposits fell in the study area. The following fields are present in the DEPOSIT.PAT file:

| COLUMN | ITEM NAME | WIDTH | OUTPUT | TYPE | N. DEC | ALTERNATE NAME |
|--------|------------|-------|--------|------|--------|----------------|
| 1 | AREA | 4 | 12 | F | 3 | |
| 5 | PERIMETER | 4 | 12 | F | 3 | |
| 9 | DEPOSIT# | 4 | 5 | B | - | |
| 13 | DEPOSIT-ID | 4 | 5 | B | - | |
| 17 | RECNO | 7 | 7 | C | - | |
| 24 | SITE | 40 | 40 | C | - | |
| 64 | CTRY. CODE | 2 | 2 | C | - | |
| 66 | STATE | 13 | 13 | C | - | |
| 79 | LATITUDE | 9 | 9 | C | - | |
| 88 | LONGITUDE | 10 | 10 | C | - | |
| 98 | COMMOD_GP | 11 | 11 | C | - | |
| 109 | COMMOD | 34 | 34 | C | - | |
| 143 | COMMOD1 | 4 | 4 | C | - | |

| | | | | | |
|-----|------------------|----|----|---|---|
| 147 | ORE. MAT | 60 | 60 | C | - |
| 207 | DEP. TYPE | 40 | 40 | C | - |
| 247 | DEP. COMMENTS | 80 | 80 | C | - |
| 327 | MODEL | 40 | 40 | C | - |
| 367 | HOST. RK. NAME | 60 | 60 | C | - |
| 427 | HOST. RK. TYPE | 60 | 60 | C | - |
| 487 | HOST. ROCK. AGE | 10 | 10 | C | - |
| 497 | ASOC. RK. NAME | 60 | 60 | C | - |
| 557 | ASOC. RK. TYPE | 60 | 60 | C | - |
| 617 | ASSOC. ROCK. AGE | 10 | 10 | C | - |
| 627 | ALTERATION | 80 | 80 | C | - |
| 707 | GEOL. COMMENTS | 80 | 80 | C | - |
| 787 | GEN. COMMENTS | 80 | 80 | C | - |
| 867 | REFERENCE | 80 | 80 | C | - |

COMMOD1 is used to assign symbols to the sites for plotting. Please note that some fields are truncated from the original MRDS information, particularly the REFERENCE field.

DLG OPTIONAL FORMAT

The DLG format is a U.S. Geological Survey standard for storing topologically structured files. It results in a compact ASCII file that is compatible with a variety of graphics software.

The Venezuelan Guayana Shield geology, faults, and correlation chart have been converted to Digital Line Graph (DLG) Optional format files. The DLG files contain tagged polygons and arcs. Annotation text is not supported in the DLG conversion software and is not present in the DLG files. The DLG file directory follows:

| | |
|---------------|--|
| cor. dl g | correlation of map units in Equidistant Conic projection |
| cordd. dl g | correlation of map units in decimal degrees |
| ft. dl g | faults in Equidistant Conic projection |
| ftdd. dl g | faults in decimal degrees |
| ge. dl g | geology in Equidistant Conic projection |
| gedd. dl g | geology in decimal degrees |
| ptype. unl | rock unit names, descriptions, colors for Versatec plotter |
| scale. dl g | scale bar in Equidistant Conic projection |
| scaledd. dl g | scale bar in decimal degrees |
| vzline. unl | fault and contact line types |

Although the conversion to ARC/INFO is more easily accomplished with ARC/EXPORT files, which are included elsewhere on this disc, the following instructions for converting DLG files to ARC/INFO may be illustrative for converting DLG files to non-ARC/INFO platforms.

These methods for converting DLG files to ARC/INFO coverages have been adapted from ARC/INFO manuals (Environmental Systems Research Institute, 1990):

1) Copy the .dlg and .unl files from the CD-ROM. For instance, from a UNIX prompt, type:

```
arc
cw vz                create arc/info workspace
q
cd vz
cdrom in
cp /pdd/cdrom/datafiles/dlg/*.unl .
cdrom out
```

2) Launch ARC/INFO and create a lookup table for the rock unit codes:

```
arc
tables
define ptype.lut
Enter Command: define ptype.lut
1
Item Name: major1
Item Width: 6
Item Output Width: 6
Item Type: i
```

7

Item Name: fmatn
Item Width: 6
Item Output Width: 6
Item Type: c
13

Item Name: ptypei
Item Width: 3
Item Output Width: 3
Item Type: c
16

Item Name: lc
Item Width: 6
Item Output Width: 6
Item Type: c
22

Item Name: color
Item Width: 3
Item Output Width: 3
Item Type: i
25

Item Name: desc
Item Width: 60
Item Output Width: 60
Item Type: c
85

Item Name:
Enter Command: alter fmatn

| COLUMN | ITEM NAME | WIDTH | OUTPUT | TYPE | N. DEC | ALTERNATE NAME |
|--------|-----------|-------|--------|------|--------|----------------|
| 7 | FMATN | 6 | 6 | C | - | |

Item name:
Item output width:
Item type:
Alternate item name: cross

| COLUMN | ITEM NAME | WIDTH | OUTPUT | TYPE | N. DEC | ALTERNATE NAME |
|--------|-----------|-------|--------|------|--------|----------------|
| 7 | FMATN | 6 | 6 | C | - | CROSS |

Enter Command: alter color

| COLUMN | ITEM NAME | WIDTH | OUTPUT | TYPE | N. DEC | ALTERNATE NAME |
|--------|-----------|-------|--------|------|--------|----------------|
| 22 | COLOR | 3 | 3 | I | - | |

Item name:
Item output width:
Item type:
Alternate item name: symbol

| COLUMN | ITEM NAME | WIDTH | OUTPUT | TYPE | N. DEC | ALTERNATE NAME |
|--------|-----------|-------|--------|------|--------|----------------|
| 22 | COLOR | 3 | 3 | I | - | SYMBOL |

Enter Command: get ptype.unl

The geology polygon lookup table should look as follows:

| COLUMN | ITEM NAME | WIDTH | OUTPUT | TYPE | N. DEC | ALTERNATE NAME | INDEXED? |
|--------|-----------|-------|--------|------|--------|----------------|----------|
| 1 | MAJOR1 | 6 | 6 | I | - | | - |
| 7 | FMATN | 6 | 6 | C | - | CROSS | - |

| | | | | | | |
|----|--------|----|----|---|---|--------|
| 13 | PTYPEI | 3 | 3 | C | - | - |
| 16 | LC | 6 | 6 | C | - | - |
| 22 | COLOR | 3 | 3 | I | - | SYMBOL |
| 25 | DESC | 60 | 60 | C | - | - |

Enter Command: list major1 fmatn ptypei lc color

| Record | major1 | fmatn | ptypei | lc | color |
|--------|--------|--------|--------|--------|-------|
| 1 | 1 | DEEP | | deep | 0 |
| 2 | 2 | BLACK | | black | 1 |
| 3 | 3 | POS | | pos | 0 |
| 4 | 4 | NEG | | neg | 0 |
| 5 | 5 | KIMB | | Kimb | 0 |
| 6 | 6 | H2O | 1 | water | 61 |
| 7 | 7 | QAL | 2 | Qal | 129 |
| 8 | 8 | QTM | 3 | Qtm | 4 |
| 9 | 9 | YXAC | 5 | YXac | 213 |
| 10 | 10 | YLG | 6 | Ylg | 106 |
| 11 | 11 | IC | 7 | ic | 72 |
| 12 | 12 | YXR | 8 | YXr | 123 |
| 13 | 13 | YXRA | 9 | YXra | 123 |
| 14 | 14 | YXRG | 10 | YXrg | 123 |
| 15 | 15 | YXRC | 11 | YXrc | 123 |
| 16 | 16 | XPR | 12 | Xpr | 123 |
| 17 | 17 | AC | 13 | ac | 213 |
| 18 | 18 | XGU | 14 | Xgu | 188 |
| 19 | 19 | XG | 15 | Xg | 247 |
| 20 | 20 | XCG | 16 | Xcg | 187 |
| 21 | 21 | DIORIT | 17 | diorit | 187 |

Continue? n

Enter Command: list desc

| Record | desc |
|--------|---|
| 1 | |
| 2 | |
| 3 | |
| 4 | |
| 5 | |
| 6 | |
| 7 | Alluvial deposits of sand, gravel, and silt (Quaternary) |
| 8 | Mesa Fm. siltstone and sandy siltstone (Pleistocene & Plio) |
| 9 | Mesa Fm. siltstone and sandy siltstone (Pleistocene & Plio) |
| 10 | Alkaline intrusive complexes (Middle to Early Proterozoic) |
| 11 | Intrusive rocks in and doming Roraima sed (Mid Prot) |
| 12 | Carbonatite intrusion of Cerro Impacto |
| 13 | Roraima Group (undivided) qtz arenite, arkose M &/or E Prot |
| 14 | Ayantepui Fm (Roraima Gp) quartz arenite, arkose M, E Prot |
| 15 | Canaima Fm (Roraima Gp) qtz arenite, arkose, etc. M, E Prot |
| 16 | Guaiquinima Fm (Roraima Gp) qtz arenite, arkose M, E Prot |
| 17 | Pre-Roraima Gp sedimentary rx clay-rich sandstone (E Prot) |
| 18 | Granitic silicic to intermediate intrusive rocks (E Prot) |
| 19 | Calc-alkaline granite & other silicic plutonic rx (E Prot) |
| 20 | Grantitic rocks of Cuchivero Group (Early Proterozoic) |
| 21 | fentitized diorite & tonalite at Cerro Impacto |

Continue? n

3) Create a lookup table for the faults and contacts.

tables

Enter Command: define vzline.lut

1

Item Name: major1

Item Width: 6

Item Output Width: 6

Item Type: i

7

Item Name: code

Item Width: 3

Item Output Width: 3

Item Type: i

10

Item Name: line

Item Width:

Integer value expected.

Item Width: 3

Item Output Width: 3

Item Type: i

13

Item Name: expl

Item Width: 45

Item Output Width: 45

Item Type: c

58

Item Name:

Enter Command: alter line

| COLUMN | ITEM NAME | WIDTH | OUTPUT | TYPE | N. DEC | ALTERNATE NAME |
|--------|-----------|-------|--------|------|--------|----------------|
| 10 | LINE | 3 | 3 | I | - | |

Item name:

Item output width:

Item type:

Alternate item name: symbol

| COLUMN | ITEM NAME | WIDTH | OUTPUT | TYPE | N. DEC | ALTERNATE NAME |
|--------|-----------|-------|--------|------|--------|----------------|
| 10 | LINE | 3 | 3 | I | - | SYMBOL |

Enter Command: it

| COLUMN | ITEM NAME | WIDTH | OUTPUT | TYPE | N. DEC | ALTERNATE NAME |
|----------|-----------|-------|--------|------|--------|----------------|
| INDEXED? | | | | | | |
| 1 | MAJOR1 | 6 | 6 | I | - | - |
| 7 | CODE | 3 | 3 | I | - | - |
| 10 | LINE | 3 | 3 | I | - | SYMBOL |
| 13 | EXPL | 45 | 45 | C | - | - |

Enter Command: get vzline.unl

43 Records Selected.

Enter Command: list

| Record | MAJOR1 | CODE | LINE | EXPL |
|--------|--------|------|------|--------------------------------------|
| 1 | 1 | 0 | 9 | MAP BORDER NEAT LINE |
| 2 | 2 | 1 | 109 | INTL BORDER LONG & SHORT DASH |
| 3 | 3 | 2 | 4 | SURFACE WATER BODIES |
| 4 | 4 | 3 | 111 | NAMED TRIBUTARIES - BLUE |
| 5 | 5 | 4 | 120 | PROVINCES (STATE BOUNDARIES) WAS 118 |
| 6 | 6 | 5 | 41 | MAIN ROADS SOLID/OPEN |
| 7 | 7 | 6 | 106 | FAULT - DASHED INFERRED UNDER RX |
| 8 | 8 | 7 | 117 | FAULT - DOTTED IMPLIED UNDER H2O-Q |
| 9 | 9 | 8 | 112 | THRUST TEETH ON LEFT |
| 10 | 10 | 9 | 1 | SECTION LINE |
| 11 | 11 | 10 | 1 | BOXES; SCALE |
| 12 | 12 | 11 | 33 | DIRT ROAD |
| 13 | 13 | 15 | 5 | MAG DERIVED FAULT |
| 14 | 14 | 16 | 1 | LEADERS ARROWS |
| 15 | 15 | 17 | 1 | FOLD AXIS |
| 16 | 16 | 18 | 101 | MAJOR MAG GRADIENT - DOT |
| 17 | 17 | 19 | 106 | FAULT - HIDDEN. WAS GSMAP 32 |
| 18 | 18 | 20 | 5 | LINEAMENT; FAULT |
| 19 | 19 | 21 | 85 | GRABEN HATCH ON RIGHT SIDE OF LINE |
| 20 | 20 | 23 | 86 | GRABEN HATCH ON LEFT SIDE OF LINE |
| 21 | 21 | 25 | 5 | SHEAR ZONE |
| 22 | 22 | 26 | 87 | GRABEN HIDDEN HATCH ON RIGHT |

Continue? n

Enter Command: q stop

4) The `dlgarc` command creates `.pcode` and `.acode` INFO files which are used to link the `.lut` tables to the coverage. Some of this linking may be automatic in non-ARC/INFO conversions. If not, the technique is to use the common `-id` field to join the `.acode` and `.pcode` files to the coverage, then use `major1` as the common field to link `ptype.lut` and `vzline.lut` to the coverage.

Choose a `dlg` file to convert - Equidistant Conic (`ge.dlg`) or Decimal Degrees (`gedd.dlg`). The following example is for the Equidistant Conic coverages:

```
kill ge all
```

```
dlgarc optional ../dlg/ge.dlg ge
```

```
build ge
```

```
build ge line
```

```
/* join the major1 item from ge.pcode using the -id as key
joinitem ge.pat ge.pcode ge.pat ge-id ge-id
```

```
/* join the unit names, colors and description from ptype.lut using major1
joinitem ge.pat ptype.lut ge.pat major1 major1
```

```
/* join major1 which contains the line type from ge.acode
joinitem ge.aat ge.acode ge.aat ge-id ge-id
```

```

/* join major1 which contains the contact line type from ge. acode
joinitem ge. aat vzline. lut ge. aat major1 major1

kill ft all
dlgarc optional ../dlg/ft. dlg ft
build ft line

/* join the major1 item from ft. acode using the -id as key
joinitem ft. aat ft. acode ft. aat ft-id ft-id

/* join major1 which contains the fault line type from ft. acode
joinitem ft. aat vzline. lut ft. aat major1 major1

kill cor all
dlgarc optional ../dlg/cor. dlg cor
build cor
build cor line

/* join the major1 item from cor. pcode using the -id as key
joinitem cor. pat cor. pcode cor. pat cor-id cor-id

/* join the unit names, colors and description from ptype. lut using major1
joinitem cor. pat ptype. lut cor. pat major1 major1

/* join major1 which contains the line type from cor. acode
joinitem cor. aat cor. acode cor. aat cor-id cor-id

/* join major1 which contains the contact line type from cor. acode
joinitem cor. aat vzline. lut cor. aat major1 major1

kill scale all
dlgarc optional ../dlg/scale. dlg scale
build scale line

/* join the major1 item from scale. acode using the -id as key
joinitem scale. aat scale. acode scale. aat scale-id scale-id

/* join major1 which contains the fault line type from scale. acode
joinitem scale. aat vzline. lut scale. aat major1 major1

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DESCRIPTION OF MAP UNITS

SEDIMENTARY ROCKS

- Qal - Alluvial deposits (Quaternary)--Sand, gravel, and silt
- QTm - Mesa Formation (Pleistocene and Pliocene)--Siltstone and sandy siltstone, generally reddish; massive to laminated. Unconsolidated gravel and sand in upper part. Called Tm on some earlier maps
- YXr - Roraima Group (Middle and (or) Early Proterozoic), undivided--
Compilation of regional ages indicates an age of 1,900–1,500 Ma (Sidder and Mendoza-S., 1991)
- YXra - Auyantepuy Formation--Mainly quartz arenite and minor arkose; forms steep cliffs and flat-topped mesas. Thickness 300–700 m. Equivalent to Matauí Formation of Reid and Bisque (1975)
- YXrg - Guaiquinima Formation--Fine-grained quartz arenite and arkose that are cross stratified; red, green, and greenish-gray jasper composed of devitrified and silicified ash and small crystals of quartz and feldspar. Weathers to form flat or gently sloping topography. Upper part is mostly covered with debris from overlying Auyantepuy Formation. Several hundreds of meters thick. Equivalent to all but the lowermost part of the Uaimapué Formation of Reid and Bisque (1975)
- YXrc - Canaima Formation--Quartz arenite, arkose, conglomeratic arenite, conglomerate, siltstone, and shale. Abundant crossbeds in arenite and arkose units. Weathers to form cliffs on resistant arenite, arkose, and conglomerate units and slopes on relatively nonresistant siltstone, shale, and silty arenite units. About 1,000–2,000 m thick. Equivalent to Uairén and Kukuenán Formations and lowermost part of Uaimapué Formation of Reid and Bisque (1975)
- Xpr - Pre-Roraima Group sedimentary rocks (Early Proterozoic)--Fine-grained to very fine grained, clay-rich sandstone, locally containing granule-size quartz grains. Interbedded with red shale and sandy shale (Briceño, 1982)
- Xco - Cinaruco Formation (Early Proterozoic)--Quartzite and sericitic quartzite and minor amounts of sericite-quartz schist and phyllite, ferruginous quartzite, and one or more intra-formational quartzite conglomerates (McCandless, 1962)
- Xlc - Los Caribes Formation (Early Proterozoic)--Weakly metamorphosed sequence of reddish arkose, polymineralic conglomerate, and finely laminated phyllite with minor felsic tuff
- Xma - Maracapa Formation (Early Proterozoic)--Weakly metamorphosed red beds and felsic volcanic rocks

EUGEOSYNCLINAL TERRANE

- Xm2 - Mafic to intermediate metalava and metatuff (Early Proterozoic)--Chlorite+epidote±actinolite schist and semischist, and greenstone, commonly with relict pyroxene phenocrysts. Relict textures suggest that protoliths were amygdaloidal flows and lithic- and crystal-rich tuffs

Xf2 - Felsic metatuff and flows (Early Proterozoic)--Quartz+muscovite±chloritoid semischist with relict phenocrysts of partially resorbed quartz and broken plagioclase replaced by albite. Groundmass mainly devitrified glass. Traces of relict lapilli locally abundant

Xs2 - Muscovite schist and phyllite (Early Proterozoic)--Quartz+muscovite±chlorite±chloritoid±ankerite schist and phyllite, and subordinate quartzite or metachert derived from sedimentary and felsic volcanic rocks. Ankeritic rocks weather to ferruginous schist and phyllite

MAFIC AND ULTRAMAFIC ROCKS OF THE EUGEOSYNCLINAL TERRANE

Xg2 - Metagabbro (Early Proterozoic)

Xu2 - Ultramafic rocks (Early Proterozoic)--Mainly metaperidotite and metapyroxenite, serpentinite, and talc schist. Cumulus texture locally preserved

VOLCANIC ROCKS

Xcv - Caicara Formation of the Cuchivero Group (Early Proterozoic)--Unmetamorphosed ash-flow tuffs and rhyolitic to dacitic flows and breccias. A U-Pb age of 1,980 Ma was obtained from ash-flow tuff near Icabarú (Brooks and others, in press). Called Xc on some maps

INTRUSIVE ROCKS

d - Diabase (Mesozoic to Early Proterozoic)--Dark-gray to greenish-gray, fine- to coarse-grained diabase of tholeiitic composition. Forms dikes and sills. K-Ar ages of diabase in region are 210–200 Ma and 1,700–1,600± 0.8 Ma (Teggin and others, 1985; Sidder and Mendoza, 1991). In cases where locations were determined from side looking airborne radar (SLAR) interpretation or from aeromagnetic data, the map symbol is crosshatched

Yp - Parguaza Granite (Middle Proterozoic)--Massive, coarsely crystalline, porphyritic granite and biotite granite commonly with rapakivi texture. These rocks have been dated about 1,545 Ma, (zircon age; 1,531±39Ma (Rb/Sr age) Gaudette and others, 1978). The Parguaza Granite is reported by Mendoza and others (1977) and Ghosh (1985) to be unconformably overlain by the Roraima Group, although isotopic dates on the Parguaza Granite (about 1,545 Ma) are within the possible age span of the Roraima Group (1,900 to 1,545 Ma) (Ghosh, 1985; Sidder and Mendoza-S., 1991). These age relations can be explained if the Roraima Group varies significantly in age within the Guayana Shield; that is, the Roraima Group may be relatively young (<1,545 Ma) where it reportedly (Mendoza and others, 1977; Ghosh, 1985) rests on the Parguaza Granite but may be older than this in the eastern parts of the Guayana Shield

Ylg - Late granite typically penetrating through and doming Roraima Group sediment (Middle Proterozoic)--In Caño Yagua (lat 3°25' N., long 65°40' W.), one body was mapped as coarsely equigranular granodiorite with pronounced rapakivi texture. In the southern part of the Río Negro (lat

1°10' N., long 66°50' W.), a similar body named the Piedra de Cocuy was described as a granodiorite with 20 percent biotite, 30 percent quartz, 40 percent feldspar, and 10 percent hornblende (Marcano and others, written communication, 1991). These rocks are characterized by small, subrounded, and generally strong magnetic anomalies and are commonly visible in SLAR imagery

ic - Carbonatite intrusion of Cerro Impacto (Mesozoic to Early Proterozoic)--Inferred primarily from geochemistry of the laterite (which is enriched in Ta, Nb, Th, Ba, and rare earth elements (REE)) and barite outcrops and from geophysical interpretation that indicates a magnetite-rich core. Carbonatite underlies a north-trending ridge that has a thick lateritic cover in a depression composed of fenitized granodiorite and tonalite. Age may be as young as 80 Ma (Mendoza and others, 1977) or as old as 1,800 Ma as inferred from intrusive relationship with the granitic rocks of the Cuchivero Group (1,900–1,800 Ma; Sidder and Mendoza-S., 1991)

YXac - Alkaline complexes (Middle and Early Proterozoic). Generally small and rounded to subrounded. The structure 2.5 km in diameter at La Churuata (3°20' N, 65°25' W) intruded the base of the eastern flank of Cerro Duida, southeast of Cerro Marahuaca, and has a Rb/Sr date of 1,300 Ma (Soares, 1985). Its composition has been described as a combination of "saturated syenites, quartz-syenites, nepheline syenites, and granites", the latter apparently deriving from assimilation of the sandstones from the surrounding Roraima Formation. Aegirine, riebeckite, biotite, zircon, monazite, and bastnaesite have been identified. This structure has associated U, Th, REE, Zr, and Sn geochemical anomalies. Another example in the northeastern corner of La Esmeralda quadrangle (3°50' N, 63°10' W), is coarsely crystalline, (phenocrysts from 1 to 2.5 cm), alkalic, with apparent flow-banding of the feldspar crystals (Jeff Wynn, U.S. Geological Survey, written communication, 1991). These rocks are generally only very weakly magnetic, yet are often visible in the SLAR imagery.. The examples in Caura quadrangle are inferred to be similar based on interpretation of aeromagnetic data. Called ac on some maps

Xg - Calc-alkaline granite and other silicic plutonic rocks (Early Proterozoic)--Martínez (1991) described these rocks as massive, coarse-grained, gray, equigranular biotite granites with rapakivi texture similar to the Parguaza batholith. These granites are seen west and north of Cerro Duida (lat 4°00' N., long 65°30' W.) in the Amazonas Federal Territory. These rocks are weakly to moderately magnetic, commonly with east-west to west-northwest trends in the magnetic anomalies. Pronounced west-northwest-striking lineaments in the SLAR imagery are characteristic, especially in the Atabapo quadrangle.

XAgr - Granitic rocks intruding the Imataca Complex (Early Proterozoic and (or) Archean)--Mostly quartz monzonite. Age uncertain; may include granitoids as old as Late Archean as well as granitoids of Early Proterozoic age equivalent to the Supamo or Cuchivero Groups

XAm - Migmatite and gneiss associated with the Imataca Complex (Early Proterozoic and (or) Archean)--Quartz monzonite, migmatite, and lineated gneiss

Xcg - Granitic rocks of the Cuchivero Group (Early Proterozoic)--Includes

granites of Guaniamito, San Pedro, and Santa Rosalía intruded into volcanic rocks of the Caicara Formation. Commonly equigranular to porphyritic, medium to coarse grained, and locally foliated. Phenocrysts include orthoclase, microcline, plagioclase, quartz, biotite, muscovite, and accessory sphene, apatite, zircon, and hornblende. Rb-Sr isotopic age range of 1,900 to 1,800 Ma (Sidder and Mendoza-S., 1991)

diorit - Fenitized zone in Xcg at Cerro Impacto--Caused by the underlying carbonatite. Indicated by smooth depression on SLAR imagery

Xgu - Intrusive rocks, undivided (Early Proterozoic)--Underlying water-inundated plains and jungle in the southeastern Amazonas Federal Territory. Where seen south and east of San Fernando de Atabapo (lat 3°45' N., long 67°40' W.), they are described as biotite hornblende granites and granite gneisses (Marcano and others, 1991). These rocks are weakly magnetic and have no apparent trend

Xgr - Granitic rocks (Early Proterozoic)--Mostly quartz monzonite. Porphyritic, medium to coarse grained, some inclusions of granodiorite. May include potassic granitoids as old as the Supamo Complex and (or) granitoids as young as or younger than the Cuchivero Group

Xsp - Supamo Complex (Early Proterozoic)--Sodic granitic rocks, paragneiss, migmatite, granodiorite, and sparse pegmatite. About 2,230 to 2,050 Ma (Sidder and Mendoza-S., 1991)

GREENSTONE BELT ROCKS OF THE GUASIPATI-EL CALLAO AREAS

Xcb - Caballape Formation (Early Proterozoic)--Mainly felsic metatuff and phyllite derived from laminated volcanoclastic siltstone and graywacke. Metatuff contains plagioclase phenocrysts, resorbed phenocrysts of quartz, wisps of pumice, and minor lithic clasts

Pastora Supergroup (Early Proterozoic)--Divided into:

Yuruari Formation

Xyf - Felsic metatuff--Quartz±muscovite±calcite semischist. Contains relict quartz and feldspar phenocrysts and traces of lapilli and breccia clasts. Minor greenstone

Xys - Muscovite schist and phyllite--Finely laminated quartz±muscovite±chloritoid±biotite±andalusite±sillimanite schist. Locally contains volcanoclastic metasandstone and felsic metatuff and breccia

Carichapo Group

Xcc - Cicapra Formation--Mafic to intermediate metatuff. Mainly albite±epidote±biotite amphibolite. Relict textures suggest interlayering of tuff and volcanoclastic sandstone

Xce - El Callao Formation--Greenstone, greenschist and minor talc schist and amphibolite. Relict pillow structure is common. Flows are commonly intercalated with flow breccias. Fine-grained quartz-hematite rocks in

uppermost part. Minor chert

GREENSTONE BELT ROCKS ELSEWHERE IN THE GUAYANA SHIELD

- Xsm - Sedimentary and metasedimentary rocks (Early Proterozoic)--Rocks of uncertain affinity along or near Río Oris in southeastern Ciudad Piar quadrangle. Corresponds in part to La Quina Formation of Bellizzia-G. and others (1976). Hematitic quartz arenite; reddish phyllitic siltstone; feldspathic arenite; conglomeratic arenite; quartz-sericite phyllite; red, laminated, fine-grained meta-arenite with graded bedding and erosional channels
- Xma - Maracapa Formation of Bellizzia-G. and others (1976) (Early Proterozoic)--Weakly metamorphosed red beds and felsic volcanic rocks
- Xmu - Greenstone belt rocks, undivided (Early Proterozoic)--Gold-bearing, greenstone belt rocks are reported in the upper Río Orinoco headwaters, La Esmeralda quadrangle. The tremendous magnetic gradients in this area tend to be sinuous and linear. They resemble gradients of the greenstone belt rocks in eastern Bolívar State. This terrane is distinguished by low to moderate relief in the SLAR imagery
- Xa - Amphibolite schist (Early Proterozoic)--Includes local coarse-grained metagabbro
- Xf1 - Felsic metatuff and flows (Early Proterozoic)--
Quartz+muscovite±chlorite semischist with relict phenocrysts of partially resorbed quartz and broken feldspar
- Xm1 - Mafic to intermediate metalava and metatuff (Early Proterozoic)--
Chlorite+albite+epidote±actinolite schist, semischist, and greenstone, locally amygdaloidal. Subordinate hornblende hornfels, albite-epidote amphibolite and minor amphibolite. Minor chert
- Xs1 - Schist, phyllite, metatuff, and metavolcanic rocks (Early Proterozoic)--Quartz-mica schist; quartz-sericite-chlorite schist; sericitic meta-arenite; sericitic-chloritic phyllite; rhyolitic, dacitic, andesitic, and basaltic metatuffs; minor metabasalt and meta-andesite
- Xg1 - Metagabbro (Early Proterozoic)--Saussuritized and, locally, amphibolitized metagabbro. Cumulus texture locally preserved
- Xu1 - Ultramafic rocks (Early Proterozoic)--Mainly metaperidotite and metapyroxenite, serpentinite, and talc schist
- Xui - Ultramafic intrusive rocks in La Flor-Carapo area (Early Proterozoic)--Medium- to coarse-grained pyroxenite sills; ophitic or subophitic to cumulate textures; saussuritized plagioclase, clinopyroxene altered to green hornblende, and sparse olivine

ROCKS OF THE IMATAKA PROVINCE

XAi - Imataca Complex (Early Proterozoic and (or) Archean)--Amphibolite- to granulite-facies quartzofeldspathic orthogneiss and paragneiss, commonly garnet-bearing, and felsic granulite. Minor amounts of intermediate to mafic orthogneiss, granulite, and charnockite. Metamorphosed iron formations and ferruginous quartzite are shown by dotted lines on map. Older than 2,800 Ma, the protolith is probably as old as 3,400 to 3,700 Ma (Sidder and Mendoza-S., 1991)

METAMORPHIC ROCKS

Xmo - Moriche Formation (Early Proterozoic)--Characterized at its type locality (Cerro Moriche on the middle Río Ventuari, lat 4°40' N., long 66°25' W.) as metasedimentary conglomerates, possible remnants of an ancestral greenstone belt terrane eroded from the protolith (Ghosh, 1985). These rocks are highly magnetic and commonly follow major structural lows along the middle and upper Río Orinoco and Río Mavaca. They generally form long, linear bodies, some of which are folded by regional metamorphic events, and are usually visible in the SLAR imagery

Xmp - Intrusive rocks of the San Carlos metamorphic-plutonic terrane (Early Proterozoic)--Covering large parts of the southern Amazonas Federal Territory. These rocks are named for the type locality at San Carlos de Río Negro (lat 1°50' N., long 67°05' W.) and crop out along most of the Río Guainía and Río Negro. They are described as granite, granite-porphyry, granite-gneiss, and augen-gneiss with relatively abundant pegmatites (Marcano and others, 1991). This terrane is characterized by strong, sinuous, east-west- to N. 70° W.-trending, elongate magnetic anomalies stacked together

Xbc - Basement complex (Early Proterozoic)--Foliated granite to granodiorite gneiss

Linear features:

Contact, dashed where inferred primarily from magnetic data
Fault, dashed where inferred, dotted where implied. Includes lineaments recognized on SLAR
Fault, transverse, arrows show relative movement where known
Fault, thrust, sawteeth on upper plate
Fault--Bar and ball on downthrown side; dashed where inferred
Fold axis, anticline, overturned anticline, syncline
Graben bounding fault, tics on downthrown side, dashed where inferred
Major deep penetrating shear zone inferred from geologic mapping and radar imagery
U or Th anomaly
Linear, curvilinear, to circular structural features recognized on SLAR
Ring structure of unknown origin visible in SLAR--In some cases may represent a volcanic caldera
Banded iron formation and quartzite of the Imataca complex
Axis of strong pervasive magnetic gradient--May represent major hidden fault or suture; U, upthrown side; D, downthrown side
Water contact
Single line tributary
International boundary

Province boundary
Paved road

Point features:

Outcrop
Unimproved airstrip
Settlement
Bedding
Foliation
Joint, vertical joint
Inclined cleavage
Sinkhole