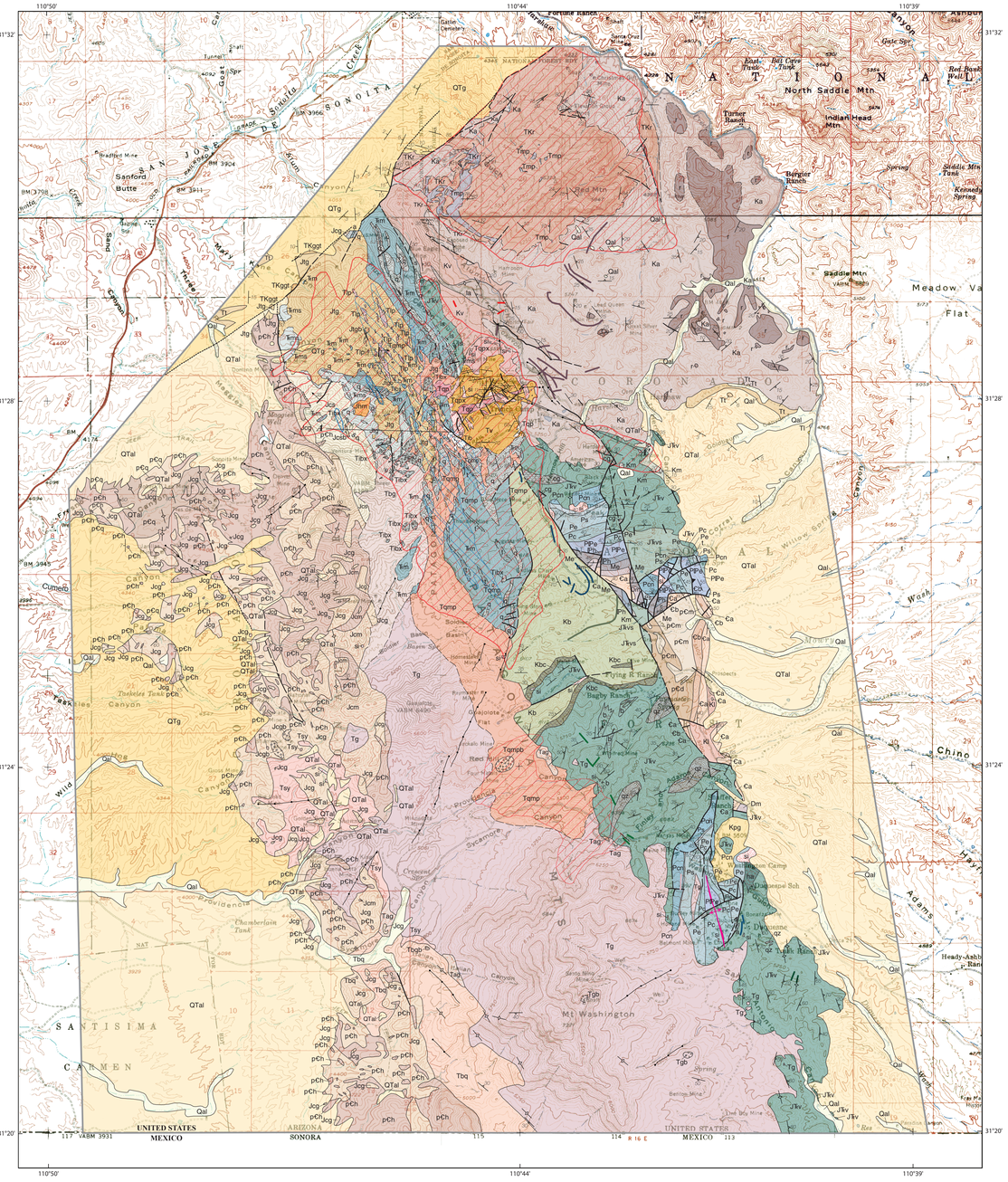
U.S. Department of the Interior
U.S. Geological Survey

Open-File Report 2015–1023
Pamphlet accompanies map



Base from U.S. Geological Survey, Elgin, Mount Wrightson, Nogales, 1958; Lochiel, 1948
Universal Transverse Mercator projection, zone 12
North American Datum of 1927

TRUE NORTH
MAGNETIC NORTH
APPROXIMATE MEAN DECLINATION, 2015

SCALE 1:48 000

CONTOUR INTERVAL 80 FEET IN WESTERN PART OF MAP
AND 50 FEET IN EASTERN PART
DATUM IS MEAN SEA LEVEL

ARIZONA
MAP LOCATION

Mapping by F.T. Graybeal (1973; 2003–2010) and P.G. Vikre (oral commun. 2003–2010), including some areas compiled from Drewes (1971, 1980), D.L.E. Huckins (fig. 2, in Quinlan, 1986), and Simons (1974).

GIS database by Lorre A. Moyer and Pamela Dunlap; digital cartography by John C. Wallis

Edited by Claire M. Landowski

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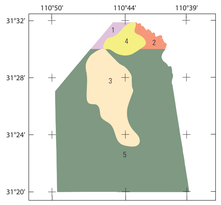
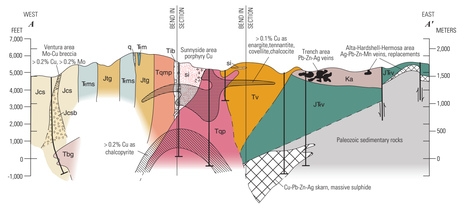


INDEX MAP SHOWING SOURCES OF GEOLOGIC MAPPING

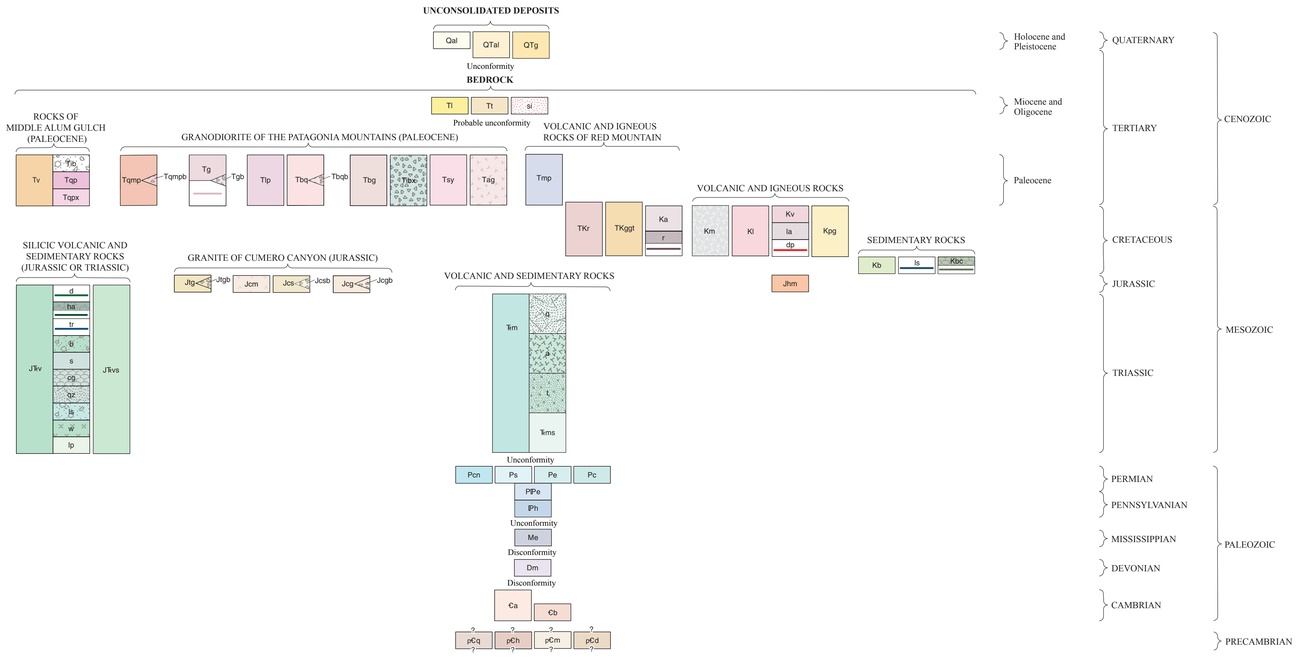
1. Drewes (1971)
2. Drewes (1980)
3. Graybeal (1973 and this report)
4. Huckins (unpub. data, 1975, in Quinlan, 1986)
5. Simons (1974)



VERTICAL EXAGGERATION =0

CORRELATION OF MAP UNITS

[See Description of Map Units (in pamphlet) for precise unit ages]



LIST OF MAP UNITS

[See Description of Map Units (in pamphlet) for complete unit descriptions]

UNCONSOLIDATED DEPOSITS

- Qal — **Younger alluvium and talus (Quaternary)**
- QTal — **Older alluvium (Quaternary and Tertiary)**
- QTg — **Gravel and conglomerate (Quaternary and Tertiary)**

BEDROCK

- Tl — **Limestone (Miocene and Oligocene)**
- Tt — **Biotite rhyolite tuff (Miocene and Oligocene)**
- si — **Silicification (Paleocene)**

ROCKS OF MIDDLE ALUM GULCH (PALEOCENE)

- Tv — **Volcaniclastic rocks of middle Alum Gulch (Paleocene)**
- Tpb — **Intrusive breccia of middle Alum Gulch (Paleocene)**
- Tqp — **Quartz feldspar porphyry of middle Alum Gulch (Paleocene)**
- Tqpx — **Xenolithic quartz feldspar porphyry of middle Alum Gulch (Paleocene)**

GRANODIORITE OF THE PATAGONIA MOUNTAINS (PALEOCENE)

- Tqmp — **Quartz monzonite porphyry**—Tqmb and pattern overlay indicate brecciated rock
- Tg — **Granodiorite**—Tgb and pattern overlay indicate brecciated rock
- Tlp — **Latite porphyry**
- Tbq — **Biotite quartz monzonite**—Tbqb and pattern overlay indicate brecciated rock
- Tbg — **Biotite granodiorite**
- Tbx — **Intrusion breccia**
- Tsy — **Syenodiorite or mangerite**
- Tag — **Biotite augite quartz diorite**

VOLCANIC AND IGNEOUS ROCKS OF RED MOUNTAIN

- Tmp — **Quartz monzonite porphyry of Red Mountain (Paleocene)**
- TKr — **Rhyolite of Red Mountain (Paleocene and Upper Cretaceous)**
- TKggt — **Gringo Gulch Volcanics (Paleocene and Upper Cretaceous)**
- Ka — **Trachyandesite (Upper Cretaceous)**
- r — **Rhyolite or latite**

VOLCANIC AND IGNEOUS ROCKS

- Km — **Pyroxene monzonite (Upper Cretaceous)**
- Kl — **Biotite quartz latite(?) (Upper Cretaceous)**
- Kv — **Silicic volcanics (Upper Cretaceous)**
- la — **Biotite latite(?)**
- dp — **Latitic(?) dike or plug**
- Kpg — **Porphyritic biotite granodiorite (Upper Cretaceous)**

SEDIMENTARY ROCKS

- Kb — **Bisbee Formation (Lower Cretaceous)**
- ls — **Limestone**
- Kbc — **Conglomerate**

GRANITE OF CUMERO CANYON (JURASSIC)

- Jtg — **Granite of Three R Canyon**—Jtgb and pattern overlay indicate brecciated rock
- Jcm — **Porphyritic granite**
- Jcs — **Equigranular alkali syenite**—Jcsb and pattern overlay indicate brecciated rock
- Jcg — **Equigranular granite**—Jcgb and pattern overlay indicate brecciated rock

IGNEOUS ROCKS

- Jhm — **Hornblende monzonite of European Canyon (Jurassic)**

SILICIC VOLCANIC AND SEDIMENTARY ROCKS (JURASSIC OR TRIASSIC)

- J'kv — **Volcanic rocks**
- d — **Diorite dike**
- ha — **Hornblende andesite dike and (or) plug**
- tr — **Porphyritic trachyte dike**
- bi — **Volcanic breccia**
- s — **Sedimentary rocks**
- cg — **Limestone conglomerate**
- qz — **Quartzite**
- ls — **Exotic blocks of upper Paleozoic limestone**
- w — **Rhyolitic welded(?) tuff**
- Ip — **Latite(?) porphyry**
- J'kvs — **Volcanic and sedimentary rocks**

VOLCANIC AND SEDIMENTARY ROCKS

- Tem — **Mount Wrightson Formation (Triassic)**
- Q — **Quartzite**
- a — **Biotite(?)-albite andesite lava(?)**
- t — **Coarse volcaniclastic beds**
- Tems — **Sedimentary rocks**
- Pcn — **Concha Limestone (lower Permian)**
- Ps — **Scherrer Formation (lower Permian)**
- Pe — **Epitaph Dolomite (lower Permian)**
- Pc — **Colina Limestone (lower Permian)**
- PIPe — **Earp Formation (lower Permian and Upper Pennsylvanian)**
- IPh — **Horquilla Limestone (Upper and Middle Pennsylvanian)**
- Me — **Escabrosa Limestone (Upper and Lower Mississippian)**
- Dm — **Martin Limestone (Upper Devonian)**
- Ca — **Abrigo Limestone (Upper and Middle Cambrian)**
- Cb — **Bolsa Quartzite (Middle Cambrian)**
- pCq — **Biotite or biotite-hornblende quartz monzonite (Precambrian?)**
- pCh — **Hornblende-rich metamorphic and igneous rocks (Precambrian?)**
- pCm — **Biotite quartz monzonite (Precambrian?)**
- pCd — **Hornblende diorite (Precambrian?)**

EXPLANATION OF MAP SYMBOLS

- **Breccia**
- **Pyrite zone**
- **Shear zone**
- **Extent of mapped area**
- **Contact**—Solid where location is accurate; dashed where location is approximate; dotted where location is concealed
- **Fault**—Solid where location is accurate; dashed where location is approximate; dotted where location is concealed. Arrows show relative motion
- **Thrust fault**—Sawteeth on upper plate
- **Anticline**
- **Vein**
- **Drill hole**
- **Bedding, inclined, showing dip**
- **Fault, inclined, showing dip**
- **Foliation, inclined, showing dip**
- **Foliation, vertical**

Geologic Map of the Patagonia Mountains, Santa Cruz County, Arizona

By

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2015

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[3]U.S. Geological Survey.
[4]Serrano IT Services, LLC.

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Digital files available at http://dx.doi.org/10.3133/ofr20151023

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