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# Quaternary Fault and Fold Database of the United States

**As of January 12, 2017, the USGS maintains a limited number of metadata fields that characterize the Quaternary faults and folds of the United States. For the most up-to-date information, please refer to the interactive fault map.**

## Mesa Butte North fault zone (Class A) No. 987

**Last Review Date: 1997-01-09**

## Compiled in cooperation with the Arizona Geological Survey

***citation for this record:*** **Pearthree, P.A., compiler, 1997, Fault number 987, Mesa Butte North fault zone, in Quaternary fault and fold database of the United States: U.S. Geological Survey website, https://earthquakes.usgs.gov/hazards/qfaults, accessed 12/14/2020 03:11 PM.**

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| **Synopsis** | Folding and normal faulting have generated a large (as much as 100-m-high) escarpment on Paleozoic bedrock with displacement down to the southeast. Lower Pleistocene basalt flows and a basaltic cinder cone (Mesa Butte) are not displaced along the southern part of the fault. North of the junction of the Mesa Butte North and Cedar Ranch [961] faults, Quaternary activity is suggested by a sharply defined graben at the base of the high escarpment. There is no documented evidence of displacement of late Quaternary alluvium. |
| **Name comments** | This collection of faults is part of the regional northeast-trending Mesa Butte fault system described by Shoemaker and others |

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| | (1974 #2166; 1978 #2155); it was named the "Mesa Butte North" fault by Menges and Pearthree (1983 #2073). The geology of the area was mapped by Ulrich and Bailey (1987 #2156). |
| **County(s) and State(s)** | COCONINO COUNTY, ARIZONA |
| **Physiographic province(s)** | COLORADO PLATEAUS |
| **Reliability of location** | Good<br>Compiled at 1:250,000 scale.<br><br>*Comments:* Trace mapped at 1:50,000 scale; transferred to 1:250,000-scale topographic base map. |
| **Geologic setting** | This structure extends beyond the northern margin of the Pliocene-Quaternary San Francisco volcanic field, on the erosion surface cut on Paleozoic rocks south of the Little Colorado River. This fault is part of a larger fault system that has a long and complex movement history (Shoemaker and others, 1978 #2155). The Mesa Butte North fault cuts Paleozoic rock, but no definite faulting Quaternary volcanic rock or other deposits has been documented. |
| **Length (km)** | 23 km. |
| **Average strike** | N40°E |
| **Sense of movement** | Normal<br><br>*Comments:* Predominantly normal movement is inferred from topographic relations. |
| **Dip Direction** | SE |
| **Paleoseismology studies** | |
| **Geomorphic expression** | This structure has formed a high (as much as 100-m-high), linear, southeast-facing escarpment on Paleozoic bedrock with a fairly narrow, fairly sharply defined graben along its base. This major escarpment is the eastern margin of the Coconino Plateau. The sharp expression of the graben along the central and northern sections of the fault zone suggests possible Quaternary activity. |
| **Age of faulted** | |

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| **surficial deposits** | Paleozoic |
| **Historic earthquake** | |
| **Most recent prehistoric deformation** | undifferentiated Quaternary (<1.6 Ma)<br><br>*Comments:* Most, and possibly all, displacement on the fault occurred prior to 500 ka (Shoemaker and others, 1974 #2166). No definitive displacement of Quaternary deposits or volcanic rocks has been reported, but fairly sharp geomorphic expression of the graben at the base of the escarpment suggests Quaternary activity. |
| **Recurrence interval** | |
| **Slip-rate category** | Less than 0.2 mm/yr<br><br>*Comments:* No data exist to determine a slip rate, but the <0.2 mm/yr category is inferred on the basis a lack of post 500 ka displacement (Shoemaker and others, 1974). |
| **Date and Compiler(s)** | 1997<br>Philip A. Pearthree, Arizona Geological Survey |
| **References** | #2073 Menges, C.M., and Pearthree, P.A., 1983, Map of neotectonic (latest Pliocene-Quaternary) deformation in Arizona: Arizona Geological Survey Open-File Report 83-22, 48 p., scale 1:500,000.<br><br>#2166 Shoemaker, E.M., Squires, R.L., and Abrams, M.J., 1974, The Bright Angel and Mesa Butte fault systems of northern Arizona, *in* Karlstrom, T.N.V., Swann, G.A., and Eastwood, R.L., eds., Geology of northern Arizona, Part I, Regional studies: Geological Society of America, Rocky Mountain Section Meeting, Guidebook, p. 355-391.<br><br>#2155 Shoemaker, E.M., Squires, R.L., and Abrams, M.J., 1978, Bright Angel and Mesa Butte fault systems in northern Arizona, *in* Smith, R.B., and Eaton, G.P., eds., Cenozoic tectonics and regional geophysics of the Western Cordillera: Geological Society of America Memoir 152, p. 341-367.<br><br>#2156 Ulrich, G.E., and Bailey, N.G., 1987, Geologic map of the SP Mountain part of the San Francisco volcanic field, north-central Arizona: U.S. Geological Survey Miscellaneous Field |

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| | Studies Map MF-1956, 2 sheets, scale 1:50,000. |

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