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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.

Shadow Mountain grabens (Class A) No. 989

Last Review Date: 1997-02-06

Compiled in cooperation with the Arizona Geological Survey

citation for this record: **Pearthree, P.A., compiler, 1997, Fault number 989, Shadow Mountain grabens, 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.**

Synopsis	Several northeast- to north-trending normal faults cut the erosion surface formed on Mesozoic rocks north of the Little Colorado River. The faults are north of the main part of the Pliocene-Quaternary San Francisco volcanic field, but they displace an outlying upper middle Pleistocene (about 300 ka) basalt flow by at least 13 m. Faulting has formed a narrow graben and other linear depressions.
Name comments	Faults and geology mapped by Akers and others (1962 #2161), Haynes and Hackman (1978 #2170), and Ulrich and others (1984 #2157); whereas the geology of the Shadow Mountain area was studied in detail by Condit (1974 #2169). The faults were termed

	the Shadow Mountain grabens by Menges and Pearthree (1983 #2073).
County(s) and State(s)	COCONINO COUNTY, ARIZONA
Physiographic province(s)	COLORADO PLATEAUS
Reliability of location	Good Compiled at 1:250,000 scale. *Comments:* Trace mapped at 1:62,500 scale; transferred to 1:250,000-scale topographic base map.
Geologic setting	These faults are located on the erosion surface cut on Mesozoic rocks in the Little Colorado River Valley. The faults cut Mesozoic bedrock and a middle Pleistocene basalt flow. The flow was K/Ar dated at 620?230 ka (Condit, 1974 #2169), but more recently was Ar/Ar dated at 300?100 ka (Conway and others, 1997 #2162). The flow surface is displaced at least 13 m in the southeast graben floor (Condit, 1974 #2169).
Length (km)	10 km.
Average strike	N29°E
Sense of movement	Normal *Comments:* Predominantly normal movement is inferred from topographic and regional relations.
Dip Direction	SE; NW; E; W
Paleoseismology studies	
Geomorphic expression	Graben scarps are low to moderately high and are fairly gentle.
Age of faulted surficial deposits	Mesozoic, middle Quaternary
Historic earthquake	
Most recent prehistoric	middle and late Quaternary (<750 ka)

deformation	*Comments:* Substantial middle to late Quaternary activity is indicated by 13 m of displacement of an upper middle Pleistocene (300?100 ka) basalt flow. The geomorphic expression of fault scarps is not strong, which suggests that much of the fault activity occurred before the late Quaternary.
Recurrence interval	
Slip-rate category	Less than 0.2 mm/yr *Comments:* A low slip rate is inferred based on about 13 m of displacement of a 200-400 ka basalt flow.
Date and Compiler(s)	1997 Philip A. Pearthree, Arizona Geological Survey
References	#2161 Akers, J.P., 1962, Relation of faulting to the occurrence of ground water in the Flagstaff area, Arizona, *in* Geological Survey Research 1962: U.S. Geological Survey Professional Paper 450, p. B97-B100. #2169 Condit, C.D., 1974, Geology of Shadow Mountain, Arizona, *in* Karlstrom, T.N.V., Swann, G.A., and Eastwood, R.L., eds., Geology of northern Arizona, Part II, Area studies and field guides: Geological Society of American, Rocky Mountain Section Meeting, p. 454-463. #2162 Conway, F.M., Ferrill, D.A., Hall, C.M., Morris, A.P., Stamatakos, J.A., Connor, C.B., Halliday, A.N., and Condit, C., 1997, Timing of basaltic volcanism along the Mesa Butte fault in the San Francisco Volcanic Field, Arizona, from 40Ar/39Ar dates —Implications for longevity of cinder cone alignments: Journal of Geophysical Research, v. 102, no. 1, p. 815-824. #2170 Haynes, D.D., and Hackman, R.J., 1978, Geology, structure, and uranium deposits of the Marble Canyon 1° by 2° quadrangle: U.S. Geological Survey Miscellaneous Investigations Map I-1003, 2 sheets, scale 1:250,000. #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.

	#2157 Ulrich, G.E., Billingsley, G.H., Hereford, R., Wolfe, E.W., Nealey, L.D., and Sutton, R.L., 1984, Maps showing geology, structure, and uranium deposits of the Flagstaff 1° by 2° quadrangle, Arizona: U.S. Geological Survey Miscellaneous Investigations Map I-1446, 2 sheets, scale 1:250,000.