

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](#).

Eminence fault zone (Class A) No. 992

Last Review Date: 1997-02-10

Compiled in cooperation with the Arizona Geological Survey

citation for this record: Pearthree, P.A., compiler, 1997, Fault number 992, Eminence 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.

Synopsis

These northeast-trending normal faults cut across the the eastern Grand Canyon and the Marble Platform, an erosion surface formed on Paleozoic rocks east of the Grand Canyon. The faults are north of the Plio-Quaternary San Francisco volcanic field where Quaternary deposits are very sparse. The faults form a sharply defined, northwest-facing escarpment (Eminence Break) with a narrow graben along much of its base. Away from the Grand Canyon, the fault escarpment formed on Paleozoic bedrock is steep. On the basis of its strong geomorphic expression, Quaternary activity is likely along the Eminence fault, but it has not been conclusively demonstrated.

Name comments	The Eminence fault zone is part of the regional Bright Angel fault system as mapped by Shoemaker and others (1974 #2166; 1978 #2155) and described by Huntoon and Sears (1975 #2175). It was called the "Eminence Break" fault zone by Menges and Pearthree (1983 #2073). The southern strands of the Eminence fault in the Grand Canyon area were mapped in detail by Huntoon and others (1976 #2174).
County(s) and State(s)	COCONINO COUNTY, ARIZONA
Physiographic province(s)	COLORADO PLATEAUS
Reliability of location	Good Compiled at 1:250,000 scale. <i>Comments:</i> Trace mapped at 1:62,500 and 250,000 scales, and compiled on 1:250,000-scale topographic base map.
Geologic setting	The Eminence fault zone is located in the eastern Grand Canyon and on the Marble Platform, an erosion surface cut onto Paleozoic rocks east of the Grand Canyon. A detailed geologic map exists for the Grand Canyon area (Huntoon and others, 1976 #2174), and less detailed mapping exists farther to the northeast (Haynes and Hackman, 1978 #2170). The Eminence faults cut Paleozoic and older bedrock but displacement of Paleozoic rocks near the Grand Canyon is less than 90 m. Although not shown on the published geologic maps, from inspection of aerial photos it appears that Quaternary alluvium has been deposited along much of the base of Eminence Break. No displacement of Quaternary alluvium has been documented.
Length (km)	36 km.
Average strike	N34°E
Sense of movement	Normal <i>Comments:</i> Predominantly normal movement is inferred from topographic and exposed stratigraphic relations.
Dip Direction	NW; SE
Paleoseismology studies	

Geomorphic expression	The primary fault escarpment, Eminence Break, is formed on the resistant Kaibab Formation. The escarpment is moderately high (<100 m), quite steep (average escarpment slopes are as much as 40°), and linear, suggesting that Quaternary activity is likely. The escarpment decreases in height rather abruptly at the northeastern end of the fault. Several scarps that define the northwestern margin of grabens along the base of Eminence Break are much lower and have moderate to gentle slopes.
Age of faulted surficial deposits	Paleozoic
Historic earthquake	
Most recent prehistoric deformation	undifferentiated Quaternary (<1.6 Ma) <i>Comments:</i> The timing estimate is weakly constrained, but Quaternary activity on this fault system is very likely based on the strong geomorphic expression of the primary fault escarpment, Eminence Break.
Recurrence interval	
Slip-rate category	Less than 0.2 mm/yr <i>Comments:</i> Low slip-rate category assigned based on the lack of demonstrable evidence for Quaternary movement.
Date and Compiler(s)	1997 Philip A. Pearthree, Arizona Geological Survey
References	#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. #2175 Huntoon, P.W., and Sears, J.W., 1975, Bright Angel and Eminence faults, eastern Grand Canyon, Arizona: Geological Society of America Bulletin, v. 86, p. 465-472. #2174 Huntoon, P.W., Billingsley, G.H., Breed, W.J., Sears, J.W., Ford, T.D., Clark, M.D., Babcock, R.S., and Brown, E.H., 1976, Geologic map of the Grand Canyon National Park, Arizona:

Grand Canyon Natural History Association (Grand Canyon, Arizona) and Museum of Northern Arizona (Flagstaff), 1 sheet, scale 1:62,500.

#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.

#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.

#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.

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