

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](#).

Aubrey fault zone (Class A) No. 995

Last Review Date: 1997-02-12

Compiled in cooperation with the Arizona Geological Survey

citation for this record: Pearthree, P.A., compiler, 1997, Fault number 995, Aubrey 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

This large, generally north-trending fault zone has generated a high, steep, linear, west-facing bedrock escarpment and formed a small, closed alluvial basin near the southwestern margin of the Colorado Plateau. Fault trends generally vary from northwest to northeast; the northernmost part of the fault trends approximately west. The northern part of the Aubrey fault zone merges with the southern part of the Sevier/Toroweap fault zone [997], and they could be considered one fault system. There has been at least 240 m of Cenozoic normal displacement in the central part of the Aubrey fault zone. Reconnaissance and detailed field studies have focused on the southern part of the fault zone, south of a major convex fault bend. On this part of the fault, middle and upper

	<p>Quaternary alluvium has been displaced as much as 5 m. Trenching investigations suggest two rupture events in the past 200 k.y. Displacement of Quaternary alluvium has not been documented north of the bend, but this part of the fault zone has not been studied in detail. The southern part of the fault probably ruptured between about 10 and 30 ka.</p>
Name comments	<p>Mapped on a reconnaissance basis by Koons (1948 #2182) and Blissenbach (1952 #2180); remapped and studied by Pearthree and others (1983 #2083) and Jackson (1990 #2181). The geology of the northern part of the fault was mapped in detail by Billingsley and others (1986 #2179) and the southern part of the fault zone was trenched by Euge and others (1992 #2095).</p>
County(s) and State(s)	<p>YAVAPAI COUNTY, ARIZONA COCONINO COUNTY, ARIZONA</p>
Physiographic province(s)	<p>COLORADO PLATEAUS</p>
Reliability of location	<p>Good Compiled at 1:250,000 scale.</p> <p><i>Comments:</i> The northern part of the fault zone was mapped at 1:24,000 scale (Billingsley and others, 1986 #2179); the southern part of the fault zone was mapped on 1:130,000-scale aerial photos. Fault traces were transferred to a 1:250,000-scale topographic base map.</p>
Geologic setting	<p>The Aubrey fault zone is located near the southwestern margin of the Colorado Plateau. It forms the eastern side of a relatively shallow, asymmetric Cenozoic basin. Paleozoic rocks are displaced at least 240 m across the fault zone. Faults also cut early to middle Tertiary sediment.</p>
Length (km)	<p>53 km.</p>
Average strike	<p>N18°W</p>
Sense of movement	<p>Normal</p> <p><i>Comments:</i> Inferred from topography and regional relations and exposures in a fault trench.</p>
Dip Direction	<p>W; SW</p>

	<i>Comments:</i> Faults in trench exposures dip very steeply, but angles are not reported.
Paleoseismology studies	Site 995-1. Two trenches were excavated across the southern part of the fault zone by Euge and others (1992 #2095). One trench revealed no obvious faults and no datable organic material, but upper to middle Pleistocene (at least 100 ka) deposits with strongly developed soil were interpreted to be downwarped about 2 m across a buried fault zone. The second trench revealed faults but no datable material. Euge and others (1992 #2095) found evidence for at least 2 displacement events with about 2 m of total displacement since deposition of an upper middle Pleistocene deposit (soil age estimate about 200 ka). A scarp-derived deposit that post-dates the youngest rupture is estimated to be latest Pleistocene (estimate of soil age greater than 15 ka) in age.
Geomorphic expression	Faulting has generated a high, steep, linear, west-facing escarpment on Paleozoic bedrock. Low, moderately sloping alluvial scarps exist downslope from the bedrock escarpment. The alluvial scarps range in height from about 2 to 5 m and have maximum slope angles of 10° to 17°, respectively. Morphologic analysis of 11 scarp profiles suggests the last event occurred about 10-20 ka (Pearthree and others, 1983 #2083).
Age of faulted surficial deposits	Paleozoic, middle to late Pleistocene, late Pleistocene.
Historic earthquake	
Most recent prehistoric deformation	late Quaternary (<130 ka) <i>Comments:</i> The time of youngest rupture was estimated to be latest Pleistocene (10-20 ka) by Pearthree and others (1983 #2083) based on scarp morphology, whereas Euge and others (1992 #2095) estimated a time of about 30 ka based on a minimum age of 15 ka for the youngest colluvium.
Recurrence interval	about 100 k.y. (200 ka) <i>Comments:</i> A recurrence interval of about 100 k.y. was estimated by Euge and others (1992 #2095) based on 2 ruptures since about 200 ka.

<p>Slip-rate category</p>	<p>Less than 0.2 mm/yr</p> <p><i>Comments:</i> A low slip rate is inferred based on roughly 2 m of displacement in the last 100-200 k.y. on southern part of fault (Euge and others, 1992 #2095), and about 5 m of displacement of an upper to middle Pleistocene alluvial fan farther north (Menges and Pearthree, 1983 #2073).</p>
<p>Date and Compiler(s)</p>	<p>1997 Philip A. Pearthree, Arizona Geological Survey</p>
<p>References</p>	<p>#2179 Billingsley, G.H., Wenrich, K.J., and Huntoon, P.W., 1986, Breccia pipe and geologic map of the southeastern Hualapai Indian Reservation and vicinity, Arizona: U.S. Geological Survey Open-File Report 86-458B, 26 p., 2 pls., scale 1:48,000.</p> <p>#2180 Blissenbach, E., 1952, Geology of the Aubrey Valley, south of the Hualapai Indian Reservation, northwest Arizona: Plateau, v. 24, no. 4, p. 119-127.</p> <p>#2095 Euge, K.M., Schell, B.A., and Lam, I.P., 1992, Development of seismic acceleration maps for Arizona: Arizona Department of Transportation Report AZ92-344, 327 p., 5 sheets, scale 1:1,000,000.</p> <p>#2181 Jackson, G.W., 1990, Tectonic geomorphology of the Toroweap fault western Grand Canyon, Arizona—Implications for transgression of faulting on the Colorado Plateau: Arizona Geological Survey Open-File Report 90-4, 67 p., 2 pls., scale 1:24,000.</p> <p>#2182 Koons, D., 1948, Geology of the eastern Hualapai Reservation: Plateau, v. 20, p. 53-60.</p> <p>#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.</p> <p>#2083 Pearthree, P.A., Menges, C.M., and Mayer, L., 1983, Distribution, recurrence, and possible tectonic implications of late Quaternary faulting in Arizona: Arizona Geological Survey Open-File Report 83-20, 51 p.</p>

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