Jump to Navigation

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.

Puyé fault (Class A) No. 2009

Last Review Date: 1995-08-17

Compiled in cooperation with the New Mexico Bureau of Geology & Mineral Resources

citation for this record: **Kelson, K.I., compiler, 1995, Fault number 2009, Puyé fault, 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 02:23 PM.**

Synopsis	The Puyé fault is a 6-km-wide zone of north-trending fault strands in the western part of the Española basin. Fault scarps on middle and late Quaternary alluvial deposits show predominantly down-to-the-east displacements with minor down-to-the-west displacements. No detailed paleoseismic investigations of the Puyé
Name comments	The Puyé fault was originally mapped as an unnamed fault zone by Kelley (1954 #1222), Smith and others (1970 #1125) and Kelley (1978 #1107). Gardner and House (1987 #1097) used the term "fault zone southwest of Hernandez" to describe the northern parts of the Puyé fault. LaForge and Anderson (1988 #1111) and Wong and others (1995 #1155) used the name Puyé fault zone.

	The Puyé fault extends from an intersection with the Hernandez section of the Embudo fault [2007b] between Clara Peak and the village of Hernandez on the north, to a point approximately 4 km west of the San Ildefonso Pueblo.
County(s) and State(s)	SANTA FE COUNTY, NEW MEXICO RIO ARRIBA COUNTY, NEW MEXICO
Physiographic province(s)	SOUTHERN ROCKY MOUNTAINS
Reliability of location	Good Compiled at 1:250,000 scale. *Comments:* The location of the Puyé fault is based on field and reconnaissance mapping compiled at a scale of 1:125,000 (Smith and others, 1970 #1125; Kelley, 1978 #1107), modified by analysis of 1:24,000- and 1:58,000- scale aerial photography compiled at a scale of 1:250,000 (Wong and others, 1995 #1155).
Geologic setting	The Puyé fault is located adjacent to the western margin of the northern Rio Grande rift. The predominantly east-down Puyé fault is subparallel to the Pajarito [2008], Guaje Mountain [2027], Rendija Canyon [2026], and Sawyer Canyon [2028] faults. The Puyé fault accommodates some of the roughly east-west extension within the Española basin of the rift (Kelson and Olig, 1995 #1147; Carter and Gardner, 1995 #1154). Wong and others (1995 #1155) and House and Hartse (1995 #1160) describe clustering of contemporary microseismicity in the vicinity of the Puyé fault.
Length (km)	19 km.
Average strike	N2°W
Sense of movement	Normal *Comments:* The Puyé fault exhibits predominantly down-to-the-east normal separation of Quaternary deposits, although there are strands of the fault that show west-down separation. Carter and Gardner (1995 #1154) note that the consistency in orientations of slip lineations along the Puyé fault, and the lack of vertical-axis rotations, suggests that there has been no significant strike slip or horizontal rotation of rocks along major faults in the area.
Dip Direction	E

Paleoseismology studies	
Geomorphic expression	Topographic scarps along the fault are present across mesas underlain by middle to late Pleistocene alluvial deposits; discontinuity is due to substantial incision of east-trending arroyos and dissection of Pleistocene geomorphic surfaces. LaForge and Anderson (1988 #1111) profiled a prominent topographic scarp along the fault, and note 11.5 m of down-to-the-east separation and a maximum scarp angle of 13°. The scarp profile data suggests multiple Pleistocene ruptures but no Holocene displacement (LaForge and Anderson, 1988 #1111). Wong and others (1995 #1155) also present profile data and estimate 7.5 m of separation and a maximum scarp angle of 18°. A distinct bevel in the profile also provides evidence of multiple surface ruptures along the fault.
Age of faulted surficial deposits	The Puyé displaces the Q1, Q2, and Q3 surfaces mapped by Harrington and Aldrich (1984 #1102), Dethier and Demsey (1984 #1090), Dethier and others (1988 #1146), and Dethier and McCoy (1993 #1168). The age of the Q1 surface is estimated to be early to middle Pleistocene (1,100–350 ka), the age of the Q2 surface is estimated to be middle Pleistocene (400–240 ka), and the age of the Q3 surface is estimated to be middle to late Pleistocene (210–130 ka) (Dethier and others, 1988 #1146; Dethier and McCoy, 1993 #1168). The age of the oldest unfaulted deposits is unknown.
Historic earthquake	
Most recent prehistoric deformation	late Quaternary (<130 ka) *Comments:* The timing of the most recent event is unknown, but displacement of the Q3 surface mapped by Dethier and others (1988 #1146) and dated by Dethier and McCoy (1993 #1168) provide evidence of possible late Quaternary activity.
Recurrence interval	
Slip-rate category	Less than 0.2 mm/yr *Comments:* Carter and Gardner (1995 #1154) and Wong and others (1995 #1155) assign a range of slip rates from 0.01 to 0.30 mm/yr for the Puyé fault, with a preferred value of 0.03 mm/yr,

	based on scarp-profile data and analysis of regional slip rates in the Rio Grande rift. Kelson and Olig (1995 #1147) used a preferred value of 0.03 mm/yr for the Puyé fault.
Date and Compiler(s)	1995 Keith I. Kelson, William Lettis & Associates, Inc.
References	#1154 Carter, K.E., and Gardner, J.N., 1995, Quaternary fault kinematics in the northwestern Española basin, Rio Grande rift, New Mexico, *in* Bauer, P.W., Kues, B.S., Dunbar, N.W., Karlstrom, K.E., and Harrison, B., eds., Geology of the Santa Fe region, New Mexico: New Mexico Geological Society, 46th Field Conference, September 27-30, 1995, Guidebook, p. 97-103. #1090 Dethier, D.P., and Demsey, K.A., 1984, Erosional history and soil development on Quaternary surfaces, northwest Española basin, New Mexico, *in* Baldridge, W.S., Dickerson, P.W., Riecker, R.E., and Zidek, J., eds., Rio Grande rift—Northern New Mexico: New Mexico Geological Society, 35th Field Conference, October 11-13, 1984, Guidebook, p. 227-233. #1168 Dethier, D.P., and McCoy, W.D., 1993, Aminostratigraphic relations and age of Quaternary deposits, northern Española basin, New Mexico: Quaternary Research, v. 39, p. 222-230. #1146 Dethier, D.P., Harrington, C.D., and Aldrich, M.J., 1988, Late Cenozoic rates of erosion in the western Española basin, New Mexico—Evidence from geologic dating of erosion surfaces: Geological Society of America Bulletin, v. 100, p. 928-937. #1097 Gardner, J.N., and House, L., 1987, Seismic hazards investigations at Los Alamos National Laboratory, 1984-1985: Los Alamos National Laboratory Report LA-11072-MS, 76 p. #1102 Harrington, C.D., and Aldrich, M.J., Jr., 1984, Development and deformation of Quaternary surfaces on the northeastern flank of the Jemez Mountains, *in* Baldridge, W.S., Dickerson, P.W., Riecker, R.E., and Zidek, J., eds., Rio Grande rift—Northern New Mexico: New Mexico Geological Society, 35th Field Conference, October 11-13, 1984, Guidebook, p. 235-239. #1160 House, L., and Hartse, H., 1995, Seismicity and faults in northern New Mexico, *in* Bauer, P.W., Kues, B.S., Dunbar, N.W.,

Karlstrom, K.E., and Harrison, B., eds., Geology of the Santa Fe region, New Mexico: New Mexico Geological Society, 46th Field Conference, September 27-30, 1995, Guidebook, p. 135–137.

#1222 Kelley, V.C., 1954, Tectonic map of a part of the upper Rio Grande area, New Mexico: U.S. Geological Survey Oil and Gas Investigations Map OM-157, 1 sheet, scale 1:190,080.

#1107 Kelley, V.C., 1978, Geology of Española basin, New Mexico: New Mexico Bureau of Mines and Mineral Resources Geologic Map 48, 1 sheet, scale 1:125,000.

#1147 Kelson, K.I., and Olig, S.S., 1995, Estimated rates of Quaternary crustal extension in the Rio Grande rift, northern new Mexico, *in* Bauer, P.W., Kues, B.S., Dunbar, N.W., Karlstrom, K.E., and Harrison, B., eds., Geology of the Santa Fe region, New Mexico: New Mexico Geological Society, 46th Field Conference, September 27–30, 1995, Guidebook, p. 9–12.

#1111 LaForge, R.C., and Anderson, L.W., 1988, Seismotectonic study for Santa Cruz dam, Santa Cruz dam modification project, New Mexico: U.S. Bureau of Reclamation Seismotectonic Report 88-2, 31 p.

#1125 Smith, R.L., Bailey, R.A., and Ross, C.S., 1970, Geologic map of the Jemez Mountains, New Mexico: U.S. Geological Survey Miscellaneous Investigations Map I-571, 1 sheet, scale 1:125,000.

#1155 Wong, I., Kelson, K., Olig, S., Kolbe, T., Hemphill-Haley, M., Bott, J., Green, R., Kanakari, H., Sawyer, J., Silva, W., Stark, C., Haraden, C., Fenton, C., Unruh, J., Gardner, J., Reneau, S., and House, L., 1995, Seismic hazards evaluation of the Los Alamos National Laboratory: Technical report to Los Alamos National Laboratory, Los Alamos, New Mexico, February 24, 1995, 3 volumes, 12 pls., 16 appen.

Search... Search

Home About Us Contacts Legal