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.**

Cat Mesa fault (Class A) No. 2122

Last Review Date: 2016-04-11

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

citation for this record: **Personius, S.F., and Jochems, A.P., compilers, 2016, Fault number 2122, Cat Mesa 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 02:22 PM.**

Synopsis	The active trace of the Cat Mesa fault extends from south of New Mexico State Highway 6 (west of Los Lunas) northward along the eastern edge of Cat Mesa. At about its midpoint, the Cat Mesa fault splits into two north-trending splays that offset Upper Santa Fe Group sediment and die out near the western edge of the Llano de Albuquerque. The Cat Mesa fault(s) offsets and exposes the late Pliocene Cat Mesa basalt flow along the eastern edge of Cat Mesa. The Cat Mesa basalt flow is interbedded with the upper part of the upper Santa Fe Group, the Ceja Formation, 6–10 m below the Llano de Albuquerque, and is offset about 30 m near the middle of the fault. Early and middle Pleistocene surficial deposits are offset about 17 m (net) across the two fault strands

	near the northern end of the fault zone. The Cat Mesa fault lies to the west of the late Pleistocene basalts of the Cat Hills, but the Cat Mesa basalt flow may have originated from the volcanic fault and dike system that fed the younger Cat Hills basalt field.
Name comments	The Cat Mesa fault was originally mapped by Kelley (1954 #1222; 1977 #1106) and in more detail by Kelley and Kudo (1978 #1307). Minor modifications were made by Machette (1978 #1223; 1982 #1401), Machette and McGimsey (1983 #1024), Maldonado and Atencio (1998 #1778), and Maldonado (2003 #7453). **Fault ID:** Fault no. 3 of Machette (1982 #1401), fault no. 2 of Machette and McGimsey (1983 #1024).
County(s) and State(s)	VALENCIA COUNTY, NEW MEXICO BERNALILLO COUNTY, NEW MEXICO
Physiographic province(s)	BASIN AND RANGE
Reliability of location	Good Compiled at 1:24,000 scale. *Comments:* Fault traces from 1:24,000-scale geologic mapping in the Dalies NW and Rio Puerco 7.5-minute quadrangles (Maldonado and Atencio, 1998 #1778; Maldonado, 2003 #7453) combined with accurate placement of exposed traces using photogrammetric methods.
Geologic setting	The Cat Mesa fault is an intrabasin fault near the western margin of the central Albuquerque-Belen basin. The Cat Mesa fault lies to the west of and does not offset the late Pleistocene basalts of the Cat Hills, but Kelley and Kudo (1978 #1307, fig. 20) inferred that the Cat Mesa basalt flow underlies and probably originated from the fault and dike system that fed the younger Cat Hills basalt field. Thus, the fault may be related to volcanic activity in the vicinity of the Cat Hills volcanic field.
Length (km)	20 km.
Average strike	N0°E
Sense of movement	Normal

Dip Direction	E; W *Comments:* Maldonado and Atencio (1998 #1778) measured a dip of 80° toward the east-northeast where the Cat Mesa fault cuts sediment of the Ceja Formation.
Paleoseismology studies	
Geomorphic expression	The Cat Mesa fault is well expressed where the resistant Cat Mesa basalt flow is exposed in the fault zone. Elsewhere, the fault strands are marked by broad swales on the largely sand-covered Llano de Albuquerque. Machette and McGimsey (1983 #1024) estimated that the Cat Mesa basalt flow is offset about 30 m near the middle of the fault. They also estimated a total of 17 m of offset in early and middle Pleistocene deposits across the two fault strands near the northern end of the fault zone.
Age of faulted surficial deposits	The Cat Mesa fault offsets the Cat Mesa basalt flow, dated at 3.0±0.1 Ma by ^{40}Ar/^{39}Ar (Maldonado and Atencio, 1998 #1778). The Cat Mesa basalt flow is interbedded with the upper part of the upper Santa Fe Group, the Pliocene-early Pleistocene Ceja Formation (Machette, 1978 #1223; Maldonado and Atencio, 1998 #1778; Maldonado, 2003 #7453), 6–10 m below the Llano de Albuquerque (Kelley and Kudo, 1978 #1307). The two fault strands near the northern end of the fault zone offset the early Pleistocene (?) Llano de Albuquerque (Machette and McGimsey, 1983 #1024).
Historic earthquake	
Most recent prehistoric deformation	middle and late Quaternary (<750 ka) *Comments:* Machette and McGimsey (1983 #1024) documented offset of the early Pleistocene (?) Llano de Albuquerque. They also speculated that if the Cat Mesa fault is related to structures controlling the basalts of the Cat Hills volcanic field, then there may be late Pleistocene movement on the Cat Mesa fault.
Recurrence interval	
Slip-rate category	Less than 0.2 mm/yr

	Comments: No detailed studies of fault offset or timing are available; low slip-rate category assigned based on evidence that the 3 Ma Cat Mesa basalt is offset about 30 m (Machette and McGimsey, 1983 #1024; Personius and others, 1999 #6930).
Date and Compiler(s)	2016 Stephen F. Personius, U.S. Geological Survey Andrew P. Jochems, New Mexico Bureau of Geology & Mineral Resources
References	#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. #1106 Kelley, V.C., 1977, Geology of Albuquerque basin, New Mexico: New Mexico Bureau of Mines and Mineral Resources Memoir 33, 60 p., 2 pls. #1307 Kelley, V.C., and Kudo, A.M., 1978, Volcanoes and related basalts of Albuquerque basin, New Mexico: New Mexico Bureau of Mines and Mineral Resources Circular 156, 29 p., 2 pls. #1401 Machette, M.N., 1982, Quaternary and Pliocene faults in the La Jencia and southern part of the Albuquerque-Belen basins, New Mexico—Evidence of fault history from fault-scarp morphology and Quaternary geology, *in* Grambling, J.A., and Wells, S.G., eds., Albuquerque Country II: New Mexico Geological Society, 33rd Field Conference, November 4-6, 1982, Guidebook, p. 161-169. #1024 Machette, M.N., and McGimsey, R.G., 1983, Map of Quaternary and Pliocene faults in the Socorro and western part of the Fort Sumner 1° x 2° quadrangles, central New Mexico: U.S. Geological Survey Miscellaneous Field Studies Map MF-1465-A, 12 p. pamphlet, 1 sheet, scale 1:250,000. #1223 Machette, M.N., compiler, 1978, Preliminary geologic map of the Socorro 1° by 2° quadrangle, central New Mexico: U.S. Geological Survey Open-File Report 78-607, 1 sheet, scale 1:250,000. #7453 Maldonado, F., 2003, Geologic map of the Rio Puerco quadrangle, Bernalillo and Valencia Counties, New Mexico: U.S. Geological Survey Miscellaneous Field Studies Map MF-2397, scale 1:24,000.

#1778 Maldonado, F., and Atencio, A., 1998, Preliminary geologic map of the Dalies northwest quadrangle, Bernalillo County, New Mexico: U.S. Geological Survey Open-File Report 97-741, 1 sheet, scale 1:24000.

#6930 Personius, S.F., Machette, M.N., and Kelson, K.I., 1999, Quaternary faults in the Albuquerque area—An update, *in* Pazzaglia, F.J., and Lucas, S.G., eds., Albuquerque geology: New Mexico Geological Society 50th Annual Field Conference, Guidebook, September 22–25, p. 189–200.

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