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.

East Tonuco fault (Class A) No. 2061

Last Review Date: 2015-12-15

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

citation for this record: **Machette, M.N., and Jochems, A.P., compilers, 2015, Fault number 2061, East Tonuco 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	Little is known about this fault, which is also expressed as a fold toward its northwestern end. It forms the southwestern structural margin of the Jornada del Muerto, a late Tertiary sedimentary basin. The fault forms scarps and a monocline on deposits of early to middle Pleistocene age, thus suggesting movement since 750 ka. No detailed studies have been conducted to better define the timing or amount of Quaternary movement on the structure.
Name comments	Seager and others (1971 #994) named this fault for its location along the eastern side of the Tonuco uplift, although the most prominent peak in the Tonuco uplift is San Diego Mountain. Surficial expression of the fault extends from the northwest

	margin of San Diego Mountain, along the east side of the uplift, and south into the Jornada basin. The southern 9.5 km of the structure is mapped as a north-side-down monocline and fault. From this point southeast and south, the fault projects to the Jornada fault, which shows no evidence of post early Quaternary movement at the surface. Note that Seager (1975 #1004) called the mostly concealed eastern projection the Jornada fault; the name East Tonuco fault is retained here given its prior use.
County(s) and State(s)	DONA ANA COUNTY, NEW MEXICO
Physiographic province(s)	BASIN AND RANGE
Reliability of location	Good Compiled at 1:24,000 scale. *Comments:* Original generalized from trace of the fault shown on 1:125,000-scale map of Seager and others (1987 #627). The location of the fault was digitized at 1:24,000 scale using photogrammetry to accurately map its trace from this map and mapping by Seager (1975 #1004).
Geologic setting	The fault forms the eastern side of the Tertiary Tonuco uplift. It places Pliocene and Pleistocene sediment of the Camp Rice Formation (on the north and east) against Precambrian, Paleozoic (minor amounts), and Tertiary rocks in the uplifted block. The La Mesa surface, which stabilized between 700 ka and 900 ka (Mack and others, 1993 #1020), is offset by the fault where it crosses Interstate Highway I-25; therefore it is more than just a monocline at that point. From I-25 north to the Tonuco Uplift, it is difficult to distinguish between a fault and monoclinal expression; it may be both. To the east of I-25, the structure is mapped as a monocline that merges with the northern part of the subsurface Jornada fault (pre-middle Pleistocene), east of the Dona Ana Mountains. Seager and others (1971 #994) cited at least 30 m of offset of Camp Rice sediment across the fault.
Length (km)	14 km.
Average strike	N44°W
Sense of movement	Normal
Dip	60°–80° E

	Comments: Seager and others (1971 #994) showed three measurements of dip along the fault portion of this structure. Along the eastern side of the Tonuco uplift, 60° and 80° dips are reported. A single relatively low-angle dip of 40° is reported at Picture Rock Canyon on the north flank of San Diego Mountain, although the majority of Seager and others' (1971 #994) cross sections show the fault as having a high-angle dip.
Paleoseismology studies	
Geomorphic expression	The majority of the fault is expressed geomorphically as an escarpment formed by sediment against bedrock, although the fault is entirely within Camp Rice sediment in at least three areas. No detailed examination has been made of the fault scarps, but Seager and others (1971 #994) summarized its expression as being essentially an uneroded fault scarp. In retrospect, Seager (written commun., 1988) considers that the steepness of the degraded scarp is the result of resistant sandstone beds of the Camp Rice Formation, which are present in both the hanging wall and footwall of the fault.
Age of faulted surficial deposits	Seager and others (1971 #994) mentioned that the fault is within sediment of the Camp Rice Formation. The La Mesa surface, which stabilized between 700 ka and 900 ka (Mack and others, 1993 #1020), is offset by the fault. Seager and others' (1971 #994) plate 1 shows a dashed fault (position approximate) in young alluvium, but from their discussion, we suspect that this unit is not offset. Thus, it appears that the fault cuts material that is as young as early to middle Pleistocene (Mack and others, 1993 #1020).
Historic earthquake	
Most recent prehistoric deformation	middle and late Quaternary (<750 ka) *Comments:* Timing based on deformation of constructional surface of fluvial facies of the Camp Rice Formation (Seager and others, 1971 #994), which probably is between 700 ka and 900 ka (Mack and others, 1993 #1020), although we cannot preclude younger movement.
Recurrence	

interval	
Slip-rate category	Less than 0.2 mm/yr *Comments:* A low slip rate is inferred from an estimate of 30 m of offset of 700–900 ka deposits.
Date and Compiler(s)	2015 Michael N. Machette, U.S. Geological Survey, Retired Andrew P. Jochems, New Mexico Bureau of Geology & Mineral Resources
References	#1020 Mack, G.H., Salyards, S.L., and James, W.C., 1993, Magnetostratigraphy of the Plio-Pleistocene Camp Rice and Palomas formations in the Rio Grande rift of southern New Mexico: American Journal of Science, v. 293, p. 49–77. #1004 Seager, W.R., 1975, Geologic map and sections of south half San Diego Mountain quadrangle, New Mexico: New Mexico Bureau of Mines and Mineral Resources Geologic Map 35, 1 sheet, scale 1:24,000. #994 Seager, W.R., Hawley, J.W., and Clemons, R.E., 1971, Geology of San Diego Mountain area, Doña Ana County, New Mexico: New Mexico Bureau of Mines and Mineral Resources Bulletin 97, 38 p., 2 pls. #627 Seager, W.R., Hawley, J.W., Kottlowski, F.E., and Kelley, S.A., 1987, Geology of east half of Las Cruces and northeast El Paso 1° x 2° sheets, New Mexico: New Mexico Bureau of Mines and Mineral Resources Geologic Map 57, 3 sheets, scale 1:125,000.