Jump to Navigation

Quaternary Fault and Fold Database of the United States

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Cedar City-Parowan monocline (and faults) (Class A) No. 2530

Last Review Date: 1999-10-01

Compiled in cooperation with the Utah Geological Survey

citation for this record: **Black, B.D., and Hecker, S., compilers, 1999, Fault number 2530, Cedar City-Parowan monocline (and faults), 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 02:53 PM.**

Synopsis	The Cedar City-Parowan monocline (and faults) comprise a poorly understood zone of Holocene(?) deformation that may form a structural bridge between the Hurricane [998] and Paragonah [2534] faults. The monocline is near the boundary between the Basin and Range and Colorado Plateau provinces.
Name comments	**Fault ID:** Refers to fault number 11-521 in Hecker (1993 #642).
County(s) and	IRON COUNTY, UTAH

State(s)	IRON COUNTY, UTAH
Physiographic province(s)	BASIN AND RANGE COLORADO PLATEAUS
Reliability of location	Good Compiled at 1:250,000 scale. *Comments:* Mapped or discussed by Threet (1963 #4590), Anderson and Bucknam (1979 #450), Anderson (1980 #4566), and Anderson and Christenson (1989 #828). Fault traces from 1:250,000-scale mapping of Anderson and Christenson (1989 #828).
Geologic setting	This complex zone of deformation is between the Hurricane [998] and Paragonah [2534] faults along the southeast side of Parowan Valley. Parowan Valley is at the southern edge of an area underlain by extrusive Tertiary volcanic rocks once continuous from near Pioche, Nevada, to Marysvale in Piute County. Some volcanic cover has been eroded to expose pre-existing topography of Paleozoic and Mesozoic sedimentary rocks. Limited depth penetration observed for some small-scale structures in the area supports a model of thin-skinned extensional response to major uplift of the plateau block. The possibility exists that a blind, plateau-bounding, normal fault zone with significant seismic potential underlies the main mountain-front monocline.
Length (km)	25 km.
Average strike	N43°E
Sense of movement	Normal
Dip Direction	NW
Paleoseismology studies	
Geomorphic expression	The monoclinal structure, which appears to be quite complex, may form a structural bridge between the Hurricane [998] and Paragonah [2534] faults (Threet, 1963 #4590). Both normal and strike-slip faults deform the monocline, and interrelated systems of faults and folds generally displace rocks down toward the uplift, forming numerous closed range-front basins that are only partially filled with sediment. In one area of the monocline along the West Fork of Braffits Creek, dramatic modern downcutting

	(possibly 20 m in 60-70 years) has exposed faults in late Holocene deposits. The faults appear to have a significant component of strike-slip motion (and not reverse, as was reported earlier by Anderson, 1980 for the main fault). A geodetic network established across Braffits Creek in 1977 indicated significant horizontal and vertical changes during the first four years-as much as 39.2 mm of position shift at one station. The lateral shifts, all southerly, are opposite to the topographic gradient (which precludes gravity sliding) and suggest tectonic deformation that is consistent with geologic evidence on one fault for right-lateral slip The modern deformation has not been accompanied by seismicity above a background threshold of about ML 3.0. This suggests that the closed basins on the flank of the plateau and possibly other tectonically youthful landforms elsewhere on the Markagunt Plateau may be due to high rates of relatively aseismic deformation.
Age of faulted surficial deposits	Holocene
Historic earthquake	
Most recent prehistoric deformation	latest Quaternary (<15 ka) *Comments:*
Recurrence interval	
Slip-rate category	Between 0.2 and 1.0 mm/yr *Comments:* Hecker (1993 #642) indicates a minimum long-term deformation rate for uplift of 0.25 mm/yr due to folding in the central part of the monocline. Hecker (1993 #642) believes a displacement rate of 10 mm/yr, as reported by the geodetic survey, seems reasonable for the Holocene faults. This rate is so much greater than that reported anywhere else in the Basin and Range province that we believe if may represent some short-term phenomena that is not representative of the faults Holocene history or is not related to crustal faulting.
Date and Compiler(s)	1999 Bill D. Black, Utah Geological Survey Suzanne Hecker, U.S. Geological Survey

References	#4566 Anderson, R.E., 1980, The status of seismotectonic studies of southwestern Utah, *in* Andriese, P.D., ed., Earthquake hazards along the Wasatch and Sierra-Nevada frontal fault zones: U.S. Geological Survey Open-File Report 80-801, p. 519-547. #450 Anderson, R.E., and Bucknam, R.C., 1979, Two areas of probable Holocene deformation in southwestern Utah: Tectonophysics, v. 52, p. 417-430. #828 Anderson, R.E., and Christenson, G.E., 1989, Quaternary faults, folds, and selected volcanic features in the Cedar City 1° x 2° quadrangle, Utah: Utah Geological and Mineral Survey Miscellaneous Publication 89-6, 29 p., 1 pl., scale 1:250,000. #642 Hecker, S., 1993, Quaternary tectonics of Utah with emphasis on earthquake-hazard characterization: Utah Geological Survey Bulletin 127, 157 p., 6 pls., scale 1:500,000. #4590 Threet, R.L., 1963, Geology of the Parowan Gap area, Iron County, Utah, *in* Heylmun, E.B., ed., Guidebook to the geology of southwestern Utah: Intermountain Association of Petroleum Geologists, Twelfth Annual Field Conference, p. 136-145.