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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.

Wasatch monocline (Class B) No. 2450

Last Review Date: 2001-10-01

Compiled in cooperation with the Utah Geological Survey

citation for this record: **Hecker, S., and Hylland, M.D., compilers, 2001, Fault number 2450, Wasatch monocline, 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 02:56 PM.**

Synopsis	Poorly understood Tertiary to Quaternary(?) fold that forms the western flank of the Wasatch Plateau in central Utah. The Wasatch monocline and its western counterpart, the Valley Mountains monocline [2449] may have formed largely in response to differential subsidence associated with salt dissolution. Hecker (1993 #642) believes that the Joes Valley fault zone [faults 2453, 2454, 2455, 2456] and other graben structures on the Wasatch Plateau may have formed in response to movement on the Wasatch monocline, and Weiss and Sprinkel (2000 #5020) believe that formation of the monocline was associated with movement on the Gunnison fault [2445].

Name comments	**Fault ID:** Refers to fault number 13-25 of Hecker (1993 #642).
County(s) and State(s)	SANPETE COUNTY, UTAH SEVIER COUNTY, UTAH UTAH COUNTY, UTAH
Physiographic province(s)	COLORADO PLATEAUS MIDDLE ROCKY MOUNTAINS
Reliability of location	Good Compiled at 1:100,000 scale. *Comments:* Mapped or discussed by Witkind Page (1984 #5022). Foley and others (1986 #1165) and Weiss and Sprinkel (2000 #5020). Monocline trace from D.A. Sprinkel (1990, Utah Geological Survey unpubl. mapping, scale 1:250,000).
Geologic setting	The western margin of the Wasatch Plateau lies within the transition between the Colorado Plateaus and Basin and Range physiographic provinces. The Wasatch Plateau is capped by nearly flat-lying lower Tertiary sedimentary strata. Along the western margin of the Wasatch Plateau, the Wasatch monocline folds these strata down to the west beneath Sanpete-Sevier Valley, which is underlain at depth by the evaporite-bearing Arapien Shale. Witkind and Page (1984 #5022), as well as other workers, attribute deformation of the Tertiary strata along the margins of the Sanpete-Sevier Valley to episodic growth and collapse of salt diapirs. However, Lawton and Weiss (1999 #4995) highlight several structural features that are not satisfactorily explained by the salt-diapirism model, and believe that the importance of diapirism in the structural evolution of the area has been overestimated. Weiss and Sprinkel (2000 #5020) believe formation of the Wasatch monocline was associated with movement on the Gunnison fault [2445], to which they ascribe a tectonic (Basin and Range extension) origin. The Wasatch monocline is underlain by a buried, high-angle normal fault (the "ancient Ephraim fault").
Length (km)	104 km.
Average strike	N°E
Sense of movement	Monocline
Dip Direction	E

Paleoseismology studies	
Geomorphic expression	The Wasatch monocline is well exposed along the west flank of the Wasatch Plateau. The monocline is best exposed in the westward-dipping limestone beds of the Flagstaff Formation, although younger strata (Colton, Green River, and Crazy Hollow Formations) form westward-dipping hogbacks west of the monoclinal slope. Most of the structural relief on the fold may be due to differential subsidence associated with salt dissolution. However, the linearity, trend, and some of the structural relief of the fold may stem from Tertiary and Quaternary basin-and-range style block faulting (Witkind, 1984 #5022). Hecker (1993 #642) believes that the Joes Valley fault zone and other graben structures (such as the Snow Lake [2452] and Gooseberry [2424] grabens) on the Wasatch Plateau may have formed in response to movement on the Wasatch monocline.
Age of faulted surficial deposits	Holocene deposits are faulted in the northern part of the Joes Valley fault zone and along the Gunnison fault, which may be genetically related to the Wasatch monocline. Evidence for deformed Quaternary sediments along the monocline has not been reported.
Historic earthquake	
Most recent prehistoric deformation	undifferentiated Quaternary (<1.6 Ma) *Comments:*
Recurrence interval	
Slip-rate category	Less than 0.2 mm/yr
Date and Compiler(s)	2001 Suzanne Hecker, U.S. Geological Survey Michael D. Hylland, Utah Geological Survey
References	#1165 Foley, L.L., Martin, R.A., Jr., and Sullivan, J.T., 1986, Seismotectonic study for Joes Valley, Scofield and Huntington North Dams, Emery County and Scofield Projects, Utah: U.S. Bureau of Reclamation Seismotectonic Report 86-7, 132 p., 3 pls. #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. #4995 Lawton, T.F., and Weiss, M.P., 1999, Geologic map of the Wales quadrangle, Juab and Sanpete Counties, Utah: Utah Geological Survey Miscellaneous Publication 99-2, 28 p. pamphlet, 2 sheets, scale 1:24,000. #5020 Weiss, M.P., and Sprinkel, D.A., 2000, Interim geologic map of the Manti 7.5' quadrangle, Sanpete County, Utah: Utah Geological Survey Open-File Report 372, 37 p. pamphlet, scale 1:24,000. #5022 Witkind, I.J., and Page, W.R., 1984, Origin and significance of the Wasatch and Valley Mountains monoclines, Sanpete-Sevier Valley area, central Utah: The Mountain Geologist, v. 21, no. 4, p. 143-156.