

## **2449S, VALLEY MOUNTAINS MONOCLINE**

**Structure number:** 2449S.

Comments Hecker's (1993) structure number 13-26.

**Structure name:** Valley Mountains monocline.

Comments:

**Synopsis:** Poorly understood Tertiary to Quaternary(?) fold that forms the east flank of the Valley Mountains in central Utah. The Valley Mountains monocline and its eastern counterpart, the Wasatch monocline (2450S), may have formed largely in response to differential subsidence associated with salt dissolution. Hecker (1993) believes that the Japanese Valley graben (fault 2447) may have formed in response to movement on the Valley Mountains monocline.

**Date of compilation:** 10/00.

**Compiler and affiliation:** Suzanne Hecker (U.S. Geological Survey) and Gary E. Christenson (Utah Geological Survey).

**State:** Utah.

**County:** Sanpete, Sevier.

**1° x 2° sheet:** Price.

**Province:** Colorado Plateaus.

**Reliability of location:** Poor.

Comments: Mapped or discussed by Witkind and Page (1984) and Willis (1991). Mapping from Witkind and Page (1984; figure 1, scale 1:750,000).

**Geologic setting:** The Valley Mountains lie at the western edge of the transition zone between the Colorado Plateaus and Basin and Range physiographic provinces. The Valley Mountains are an eastward-tilted fault block composed chiefly of Cretaceous and Tertiary strata (Witkind and Page, 1984). Along the eastern margin of the range, strata are folded down to the east beneath Sanpete-Sevier Valley, which is underlain at depth by the evaporite-bearing Arapien Shale. Witkind and Page (1984), as well as other workers, attribute deformation of the Tertiary strata along the margins of Sanpete-Sevier Valley to episodic growth and collapse of salt diapirs. However, Lawton and Weiss (1999) 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.

**Sense of movement:** NA

Comments:

**Dip:** No data

Comments:

**Dip direction:** E.

**Geomorphic expression:** The strata that form the crest of the Valley Mountains are flat-lying, but gradually flex downward to the east forming the east-facing Valley Mountains monocline. The Flagstaff limestone forms much of the monoclinial slope, and younger Colton, Green River, and Crazy Hollow strata have been almost completely removed except near the base of the monocline (Witkind and Page, 1984). Most of the structural relief 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 block faulting (Witkind and Page, 1984).

Hecker (1993) believes that the Japanese Valley graben (2447), formed in flat-lying beds at the crest of the Valley Mountains, may have formed in response to movement on the monocline.

**Age of faulted deposits:** Middle and late Quaternary deposits are displaced in the Japanese Valley graben at the crest of the Valley Mountains, perhaps associated with uplift across the subjacent monocline. Two small parallel faults just east of the Valley Mountains (not shown on map) cut Quaternary pediment deposits, but may be the result of non-tectonic processes (Willis, 1991). Evidence for deformed Quaternary sediments along the monocline has not been reported.

**Paleoseismology studies:** None.

**Timing of most recent paleoevent:** (5) Quaternary (<1.6 Ma).

Comments:

**Recurrence interval:** NA

Comments:

**Slip rate:** NA

Comments:

Length: End to end (km): 39

Cumulative trace (km): 39

**Average strike** (azimuth): N6°W

## **REFERENCES**

Hecker, Suzanne, 1993, Quaternary tectonics of Utah with emphasis on earthquake-hazard characterization: Utah Geological Survey Bulletin 127, 2 plates, scale 1:500,000, 257 p.

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, 29 p., scale 1:24,000.

Willis, G.C., 1991, Geologic map of the Redmond Canyon quadrangle, Sanpete and Sevier Counties, Utah: Utah Geological Survey Map 138, 17 p. pamphlet, scale 1:24,000.

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. 1, no. 4, p. 143-156.