COMMENTS AND REPLIES

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Comment

COMMENT on "Preexisting fractures and the formation of an iconic American landscape: Tuolumne Meadows, Yosemite National Park, USA"

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Becker et al. (2014) assert that Tuolumne Meadows is a geomorphic anomaly. They cite Matthes (1930), but he did not assert this, nor did USGS Sierran geomorphologist Clyde Wahrhaftig. The authors propose major glacial erosion in the meadows and look for support for this hypothesis by citing Dühnforth et al. (2010). But their data argue *against* major glacial erosion. Tuolumne Meadows is not an exception; throughout the range, glaciers eroded precious little, removing loose materials, including those developed from preexisting fractures created during uplift which, I agree, do guide the geomorphic evolution of the Sierra Nevada. I discuss joints on pages 341–343 and 372 of my book, *The Geomorphic Evolution of the Yosemite Valley and Sierra Nevada Landscapes*. The authors cite this book (Schaffer, 1997, p. 63–70 [Chapter 8]) and Matthes' "benchmark paper" (1930), giving the reader the impression that I support their paper, which I do not.

My Chapter 8 shows that Matthes was torn between geomorphology taught by Harvard's William Morris Davis and extant field evidence. Matthes repeatedly sided with Davis rather than with the evidence, and where neither worked, he invented evidence, such as nonexistent glacial deposits and Yosemite Valley cross profiles (e.g., Schaffer, 1997, p. 258).

Becker at al. have done likewise, applying *presumed* evidence beneath Tuolumne Meadows to a false paradigm (given below), that glaciers always cause major erosion in ranges such as the Sierra Nevada. They would have us believe that after initial fracturing of the bedrock some 80 million years before glaciation, the rock remained until glaciers appeared. Remnants of the northern Sierra's Eocene gravels and Oligocene rhyolites on or near canyon floors demonstrate that those landscapes have changed little in the intervening time. In the glaciated lands west of Donner Pass, net incision over 30 Ma is meters, not tens of meters. My Chapter 9 contains Matthes' lengthy Technical Abstract to his severely flawed Professional Paper 160. Virtually every paragraph is negated by extant field evidence. Later chapters document ~300 sites of glacial evidence identified on topographic maps for geologists to examine.

Becker et al. also make an incorrect comparison between Tuolumne Meadows and Mono Creek. They should have used Vermillion Valley, a similar valley under Lake Edison. There, glaciers performed only minor incision, based on near-bottom Pliocene basalt remnants. From the San Joaquin drainage south to the Kern's, the topography, lithology, and geologic structure are quite different from those north of Yosemite National Park, and any pronouncement on a part of the range's geomorphology must work across the entire range. The southern half of the range contains ~100 mapped basalt remnants, which date from ca. 2–12 Ma and occur in glaciated and unglaciated terrain and from summits to valley floors. Had glaciers been effective, all basalts would have been eroded from lower slopes and canyon floors.

Becker et al. should have compared Tuolumne Meadows with large, flat-floored meadows in the southern Sierra. From north to south, these are Whitney, Mulkey, Golden Trout Creek, Ramshaw, Templeton, Monache, and Rockhouse. In the dry, *unglaciated* Dome Land Wilderness to the west above Rockhouse Basin the scenery is "classically" glacial, with a hanging U-shaped tributary canyon and roches moutonnees (see my book, p. 272–283). These features can be explained if Sierran uplift was complete by ca. 80 Ma and followed by large tropical river erosion and subsurface weathering until ca. 34 Ma.

The current paradigm—late Cenozoic uplift/major glacial erosion—traces back to Josiah Whitney (1865, p. 248), whose geologic cross section does not exist. Furthermore, it could not exist without myriad miracles (Schaffer, 2014). Whitney is long forgotten, yet the paradigm thrives (e.g., the Sierran uplift Penrose Conference, Busby and Putirka, 2010). Today, the paradigm's leading proponent (Wakabayashi, 2013) proposes that northern Sierran uplift commenced at ca. 3 Ma. However, he missed dozens of lower-slope basalt remnants on both sides of his study area, the upper North Fork Feather River canyon, and these negate his methodology and results. Thermochronology has been used in the southern Sierra and has produced incongruent results. Nevertheless, this method produces desired results for fjords and so is used worldwide.

In conclusion, Becker et al. (2014) is not supported by extant field evidence.

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