

Geology of the upper Arkansas River valley, Colorado - a field mapper's perspective.

Colorado Scientific Society

Field Trip, Sept 15-16, 2018

Trip leaders: Karl Kellogg (USGS emeritus), Cal Ruleman (USGS), and Scott Minor (USGS)

This two-day trip will examine a number of geologic features of the upper Arkansas River valley that resulted from recent USGS mapping in the region. The valley comprises a northern portion of the Rio Grande rift, a north-trending zone of crustal extension that extends from Mexico northward into northern Colorado. The initiation of rifting at about 30 Ma (Oligocene) is closely associated with a change from calc-alkaline (mostly andesitic to dacitic) volcanics to bimodal rhyolite-basalt assemblages, including the rhyolite flows of the Nathrop volcanics. The region has experienced multiple phases of volcanism and plutonism from Cretaceous to Oligocene and we'll visit various examples of these igneous rocks. The Colorado mineral belt, a product of multiple generations of igneous activity, traverses the northern part of the valley, and contains the world-class ore deposits of the Leadville mining district (mostly bearing Pb, Zn, Ag, and some Au and Cu). We will examine potentially active normal faulting associated with crustal extension, and discuss geomorphic, paleoseismic, and geodetic relationships related to Pleistocene basin evolution and regional tectonic and geomorphic development. The glacial history has been recently enhanced by abundant cosmogenic dating of multiple generations of glacial till and associated outwash deposits, revealing the rapidity of the Last Glacial Maximum demise as well as the overall timing of the Pleistocene glacial record. We will visit large glacial outburst flood deposits associated with the Last Glacial Maximum (Pinedale) damming of the Upper Arkansas Valley by the Clear Creek glacial system, a late Pleistocene ~22 ka glacial complex that repeatedly dammed the Arkansas River creating monstrous, catastrophic breakout floods, carrying truck-sized boulders downstream. We will examine terraces containing these boulders and the chronologic constraints on basin-wide terrace development. We will also visit a location where the Lava Creek B ash (~640 ka) from the Yellowstone caldera was captured within basin stratigraphy, providing a constraint for the onset of Pleistocene glaciations and its associated effects on the landscape. We have worked out the detailed terrace stratigraphy of the valley, which extends as far back as the early Pleistocene and possibly Pliocene and directly relates to the formation of the Royal Gorge. Extensive basin-fill deposits of the lower Pliocene and Miocene Dry Union Formation will be visited, as will some of the extensive pre-rift (33-39 Ma) volcanic rocks which include several major ignimbrites and several minor ones. As time allows, we will visit other interesting localities – there are lots of them!

We will depart at 8 a.m. sharp Sept. 15 from the parking lot on the west side of the Federal Center in Lakewood (just east of Union Blvd, and south of 6th Ave.), near the light rail terminal, and spend one night in Buena Vista We will return by 5:30 p.m. Sept. 16.