GRAND JUNCTION GEOLOGICAL SOCIETY

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OCTOBER MEETING

WEDNESDAY 18, 2017

Joint meeting with the CMU Geology Students
7:30 PM
Saccomanno Lecture Hall
(In the Wubben Science Building)

Ned Sterne, Citizen Scientist and Consulting Geologist

Will Speak On

"A Restorable, Crustal-Scale Cross Section Across The Colorado Rocky Mountains Following I-70"

Abstract on the Reverse

Guests Are Always Welcome

ABSTRACT

A restorable, crustal-scale cross section across the Colorado Rocky Mountains following Interstate 70

Edward J. Sterne, James W. Granath, Robert G. Raynolds, Stephen P. Cumella, and John J. Miller

This project builds a restorable section following Interstate 70 (I-70) across Colorado. It incorporates potential field, seismic, well, thermochronology, and surface data, much of which has appeared since a section like this was last published. Restoring a section requires establishing its upper and lower bounds. The top of Cretaceous strata was chosen as the upper bound because it marks the beginning of Laramide basement unroofing at this latitude. In areas stripped to basement, missing stratal and structural cover geometries were projected into the section using apatite low-temperature thermochronology and strike analogs. The lower bound was taken from magnetotelluric data (D. Feucht, CU Boulder, pers. comm.) acquired between the Denver and Piceance basins. These show a mid-crustal low-resistivity zone that was assumed to be the basal decollement for thrusts in the upper crust and likely corresponds to the boundary between brittle upper and ductile lower crust. Subsurface geometries were based on wells and seismic. Ancestral Rocky Mountain thrusts were treated as precursor Laramide thrusts, an assumption supported by their reactivation during the Laramide. Missing Pennsylvanian evaporites in the Eagle Basin were built back into the section guided by restoration of Miocene basalts to their baseline elevation prior to Neogene evaporite dissolution. Offsets on normal faults related to Tertiary extensional overprint of the Laramide orogen were estimated using apatite low-temperature thermochronology. The cover and subsurface geometries were projected from the crooked line along I-70 into a straight "true dip" section paralleling the approximate Laramide shortening direction. The palinspastic restoration shows approximately 34 percent or 79 km (50 miles) of shortening across the central Colorado uplifts. Once the straight section had been adjusted to allow a robust restoration, it was projected back into the crooked I-70 section to better illustrate the geology seen while traveling the interstate. Building the section revealed (1) the prevalence of fault-bend folds, stacked triangle zones and backthrusts in triangle zones, (2) that such geometries are necessary to allow the amount of shortening indicated by the subsurface data and called for in the restoration, and (3) the basal decollement must deform during thrusting either by thrust loading or underthrusting to explain the greater depths of some of the hinterland versus foreland basins.