

GRAND JUNCTION GEOLOGICAL SOCIETY

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NOVEMBER MEETING

Joint Meeting with the CMU geology students

WEDNESDAY NOVEMBER 20, 2013

7:30 P.M.—Saccomanno Lecture Hall

(In the Wubben Science Building)

Dr. Andres Aslan, CSU

Will speak on

“Late Cenozoic River Incision Histories of the Upper Colorado River System”

ABSTRACT

Joint Authors: Eric Kirby, Karl Karlstrom, Matt Heizler, Russell Rosenberg

The Colorado Rocky Mountain province experienced multiple phases of uplift since retreat of the Cretaceous Seaway ca. 80 Ma. To evaluate latest phases of uplift, we present data on the incision histories of the Colorado, Green and Yampa Rivers over the past 10 Ma. We also draw connections between patterns of river incision and mantle tomographic images to explain landscape changes during the Neogene.

Provenance of river gravels and ages of paleosurfaces defined by Miocene basalt flows show that an upper Colorado River flowed west from the Rockies out onto the Colorado Plateau beginning ca. 16-11 Ma, prior to integration through Grand Canyon ca. 6-5 Ma. Colorado River incision in the Glenwood Springs-Grand Mesa region began 9.5-7.8 Ma and resulted in 750 to 1500 m of incision at rates of 96 to 155 m/Ma since 11 Ma. Largest magnitudes of incision and fastest incision rates are associated with areas of Miocene basaltic magmatism such as the Grand Mesa and Elkhead volcanic fields. In the Yampa River drainage, incision began <9 Ma, and may have begun as late as ca. 6 Ma. The Yampa River has incised a maximum of ~800 m at rates of 90 to 115 m/Ma since 6-9 Ma. Integration of the upper Green River with the upper Colorado River system is poorly constrained between 8 and 2 Ma, and probably post-dates the advent of the ancestral Yampa River. Using Oligocene river gravels as a datum, the Green River has incised <400 m at rates of <20 m/Ma over the past ca. 30 Ma.

Comparison of river incision patterns with P-wave mantle tomography images suggests possible connections between mantle processes and landscape evolution. Upper Colorado headwater regions have the fastest incision rates and slowest P-wave velocities. In contrast, upper Green River headwaters have slower incision rates and faster P-wave velocities. We infer that post-10 Ma differential bedrock incision can be explained by differential rock uplift of the Colorado Rockies relative to the upper Green River Basin caused by young and perhaps ongoing mantle flow and/or increased mantle buoyancy beneath the Colorado Rocky Mountains.

GUESTS ARE ALWAYS WELCOME

The election of the officers for 2014 will be held at this meeting.

**Your dues for 2014 are due now. Still only \$15.00. Students are free.
Bring your check to the meeting or mail to GJGS PO Box 4045
Grand Junction, CO 81502-4045**