

GRAND JUNCTION GEOLOGICAL SOCIETY

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OCTOBER MEETING

WEDNESDAY, OCTOBER 19, 2022

Joint meeting with the CMU Geology Students

7:30 PM

Sacomanno Lecture Hall

(Room 141 in the Wubben-Science Building)

Mike Blum

Richie Distinguished Professor

Earth, Energy and Environment Center

University of Kansas, Lawrence, Kansas

Will Speak On

**“Dakota Group Fluvial Systems of the Colorado Front
Range: Provenance, Geochronology, and Significance to the
Alberta Oil Sands and North American Sediment Routing”**

Guests Are Always Welcome

Dr. Blum’s Abstract on Next Page

**Please note: Dr. Blum will present in person but the talk
will also be available by Zoom. The Zoom instructions
follow the Bio and Abstract.**

Prof. Mike Blum received his PhD from U. of Texas-Austin in Physical Geography studying Late Quaternary Colorado River system response to climate and sea level change. Dr. Blum has taught at Southern Illinois University, U. of Nebraska, and LSU. He also was a principal scientist at Exxon-Mobil Research Lab in Houston leading field trips to the Gulf Coast and Book Cliffs. Dr. Blum's research has spanned river systems in the U.S. and Europe, and focuses on source-to-sink geohistories. He has published numerous articles including in *Nature Geosciences*. Currently, Dr. Blum is the Ritchie Distinguished Professor in the U. of Kansas Geology Department.

Dakota Group Fluvial Systems of the Colorado Front Range: Provenance, Geochronology, and Significance to the Alberta Oil Sands and North American Sediment Routing

Professor Bob Weimer of the Colorado School of Mines made numerous first-order contributions to understanding of Cretaceous rocks of the Colorado Front Range and, more broadly throughout the Laramide Rockies and associated sedimentary basins. This presentation discusses research that built on his work and the work of others, and summarizes new detrital-zircon (hereafter DZ) U-Pb provenance and geochronology data from the Cretaceous Dakota Group, and outlines the significance of Dakota Group strata to Cretaceous sediment routing in North America.

The Front Range Dakota Group rests on the sub-Cretaceous unconformity, and represents fluvial, deltaic, and shallow-marine strata deposited in the Sevier foreland basin backbulge. My students and I have analyzed the DZ U-Pb signatures of fluvial deposits within the Late Jurassic Morrison, Early Cretaceous Lytle and the mid-late Cretaceous Muddy fluvial sandstones, to help define provenance and sediment routing, and provide maximum depositional ages (MDAs). Morrison, Lytle and Muddy fluvial systems had headwaters in the Western Cordillera Sevier fold-and-thrust belt and magmatic arc, consistent with previous interpretations. However, samples from the southern part of the Front Range and Great Plains represent a slightly different source terrain from samples collected in the northern Front Range, which indicates two long-lived west-derived river systems. Moreover, we obtained MDAs of ca. 148-150 Ma from the Morrison Formation, and ca. 98-100 Ma from Muddy sandstones: both units were deposited during periods of high flux in the Cordilleran magmatic arc, syndepositional zircons are common, and MDAs are consistent with biostratigraphic ages. The Lytle and Plainview are Barremian through early Albian in age from biostratigraphic data, a period that corresponds to a magmatic lull: syndepositional zircons are uncommon and we did not obtain useful MDAs.

The Dakota Group study is part of a broader effort to understand Early Cretaceous sediment routing to the Alberta foreland basin. Early DZ U-Pb studies proposed that the Barremian to Aptian McMurray Formation in Alberta represents the trunk stream of a continental-scale south-to-north flowing river system. Our new data tests this model with DZ U-Pb analyses from the McMurray, as well as Dakota Group fluvial sandstones of the Front Range, western Kansas, the Black Hills in South Dakota, and eastern Nebraska and Kansas. DZ U-Pb signatures of the Cheyenne sandstone in western Kansas and the Lakota sandstone of the Black Hills are statistically indistinguishable from the McMurray signature in east central Alberta, and represent

a mixture of Lytle sandstones of the Front Range, and the classic east-derived Appalachian DZ U-Pb signature in Dakota Group strata that crop out in eastern Nebraska and Kansas. These data refine previous interpretations of a continental-scale river system by clearly fingerprinting headwaters that stretched from the Sevier fold-and-thrust belt and magmatic arc of the SW US to the Appalachians in the SE US: this river system was the Amazon or Mississippi of its time, and predated Latest Cretaceous to Paleocene continental-scale drainage reorganization that routed water and sediment from southern North America to the Gulf of Mexico.

ZOOM MEETING INSTRUCTIONS (If you can't come in person)

Andres Aslan is inviting you to a scheduled Zoom meeting.

Topic: GJGS Oct meeting

Time: Oct 19, 2022 07:00 PM Mountain Time (US and Canada)

Join Zoom Meeting

<https://coloradomesa.zoom.us/j/93261640110?pwd=UIZxbkZZUDZ6VDV3OFIHOFpaY0pQQT09>

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