Grand Junction Geological Society

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This Month's Presentation

This month's meeting will be two poster presentations by CMU Seniors.

Arron Orelap

Will Present His Poster:

Novel use of $^{40}Ar/^{39}Ar$ Detrital Sanidine Dating: Eocene-Oligocene Landscape Evolution, Western Colorado, USA

And

KennaLee Worster

Will Present Her Poster:

Application of RGB and multispectral drone (sUAS) photogrammetry of alluvial fans in the Grand Valley of Colorado USA for detecting shallowly-buried channel features that may act as groundwater conduits

Meeting Time and Location

December 6, 2023

Joint meeting with the CMU Geology Students

7:30 p.m.

Saccomanno Lecture Hall (Room 131 in the Wubben Science Building at Colorado Mesa University

Zoom Details

The presentations will be two posters by CMU Seniors. As such, there will be no Zoom component to the meeting. Please come in person to see the posters. The students will be presenting the posters to the GSA and AGU meetings this year.

The poster abstracts are on the next page.

Important Announcements

Dues are due! It's time to pay our yearly $15 dues and there are several ways to do it. You can mail a check made out to the Grand Junction Geological Society Foundation to our P.O. box: Box 4045, Grand Junction, CO 81502-4045.

Or you can pay by credit card at our web site: www.gjgs.org. This goes into a PayPal account, which we then transfer to our bank.

Or, you can bring the $15 dues as a check or cash and give it to our treasurer, Craig Goodknight, at our meeting. If you don't know Craig, give it to me and I'll pass in along.

Abstracts

Novel use of $^{40}Ar/^{39}Ar$ Detrital Sanidine Dating: Eocene-Oligocene Landscape Evolution, Western Colorado, USA

Aaron Orelup, Coral Copenhaver, Harley Bittle, Andres Aslan, Matt Heizler

Abstract. Dating of detrital minerals such as sanidine in continental rocks provides temporal frameworks for evaluating the timing of episodes of sedimentation, erosion, tectonism, and climate change. Moreover, this information provides insights on paleogeography and processes of landscape evolution. $^{40}Ar/^{39}Ar$ detrital sanidine geochronology was used to evaluate the precise age of the Cenozoic Telluride Conglomerate and to reconstruct the paleogeography of western Colorado during Telluride Conglomerate deposition.

The Telluride Conglomerate is interpreted to represent an alluvial fan complex that existed just prior to explosive Oligocene volcanic activity that formed the San Juan volcanic field of southwestern Colorado. The unit consists chiefly of arkosic conglomerate and sandstone and thickens from ~20 m (east) to as much as ~300 m (west). The Telluride Conglomerate overlies a regional unconformity referred to as the Rocky Mountain Erosion Surface (RMES).

13 samples of the Telluride Conglomerate from 4 locations were acquired for analysis. Results from Cimarron Ridge indicate that the maximum depositional age for the upper Telluride Conglomerate is 34.6 Ma. Fine-grained sand and gravelly units that overlie the upper Telluride Conglomerate at Cimarron Ridge produced dates as young as ~32 Ma. These age estimates are consistent with regional dates of ~32 Ma for overlying volcanic rocks of the San Juan Formation. Gravel clasts in the Telluride Conglomerate at Cimarron Ridge consist mostly of Precambrian granite and dacite reworked from nearby Cretaceous intrusions. Ca. 35-32 Ma sanidine grains in the Telluride Conglomerate suggest that Late Eocene-Early Oligocene Telluride rivers flowed west from highlands associated with newly emergent volcanoes of the Sawatch volcanic field of western Colorado. One interpretation is that the Telluride Conglomerate and the underlying RMES record localized uplift and volcanism related to asthenospheric upwelling and the ignimbrite flareup event of the western U.S.

Application of RGB and multispectral drone (sUAS) photogrammetry of alluvial fans in the Grand Valley of Colorado USA for detecting shallowly-buried channel features that may act as groundwater conduits

KennaLee Worster and Gregory S. Baker

Abstract: Paleochannels in alluvial fans are known to be potentially important high-permeability groundwater conduits in semi-arid climates. In these systems, identification of paleochannels is critical in both clean and contaminated water studies. Sites in and around the Grand Valley along the Western Slope of Colorado, USA, represent the leading edge of this kind of water-related research in high altitude semi-arid environments, due to the ongoing water-resource concerns in the Upper Colorado River Basin and potential point sources of groundwater contamination entering the basin via throughflow/shallow groundwater flow. The objective of this study is to assess detection of shallowly-buried alluvial fan paleochannels at a test site near Grand Junction, Colorado, associated with potentially critical water flow. Data include: (i) high-resolution RGB & multispectral photogrammetric maps of the test site, (ii) three-dimensional structure-from-motion (SFM) models of the test site in RGB and multispectral, and (iii) geological maps along the edges of the target alluvial fan site where modern valleys expose cross-sections of paleochannels (used for control). The results of this project—particularly the advances in multispectral orthophotogrammetry—may be applicable to similar sites in similar areas, as well as possibly expanded to other climates and elevations with similar shallowly-buried groundwater pathways.