# Grand Junction Geological Society

http://www.gjgs.org/

## This Month's Presentation

### Dr. Rex Cole

**Professor emeritus, CMU**

### Gravel-Capped Terraces on the SW Flank of Grand Mesa: Implications for Late Cenozoic Climate and Uplift Histories

**Abstract on next page**

## Meeting Time and Location

**October 16, 2024**

**7:30 p.m.**

**Joint meeting with the CMU Geology Students**

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

## Zoom Details

**Andres Aslan is inviting you to a scheduled Zoom meeting.**

**Topic: Oct GJGS meeting**

**Time: Oct 16, 2024 07:00 PM Mountain Time (US and Canada)**

**Join Zoom Meeting**

**https://coloradomesa.zoom.us/j/92139071884**

**Meeting ID: 921 3907 1884**

**Note: We try to open Zoom early so people can log in.**

## Important Announcements

The end of our GJGS year is rapidly approaching and we need members to step up and volunteer for our various offices. We've all been in these jobs for multiple years now and other members need take their turns. The jobs are:

President – runs the meetings

Vice President/speaker chair – gets speakers for meetings

Secretary – sends out announcements, files tax forms

Treasurer – collects mail and money, pays bills

Councilor – helps VP find spearers, provides advice, etc.

# Abstract


### Gravel-Capped Terraces on the SW Flank of Grand Mesa: Implications for Late Cenozoic Climate and Uplift Histories

Grand Mesa is a large erosional landform that was created over the last 10 million years during a significant phase of regional uplift and climate change. The Mesa exists today because it has a thick, resistant cap of Miocene lava (up to 600 ft; 183 m), which partially protects the underlying soft sedimentary rocks from erosion. Today, the lava cap is about one mile (1.6 km) higher than the surrounding rivers and streams. The gravel-capped terraces discussed in this presentation are found on the lower flanks of the Mesa at elevations ranging from 4,900 to 9,200 feet (1,493-2,804 m). The greatest terrace concentration (N=84) occurs between Whitewater and Leroux Creeks. All rest on the Mancos Shale

Genetically, three primary types of terrace deposits exist: 1) fluvial-associated, 2) glacial outwash-associated, and 3) pediment-associated. Fluvial-associated deposits consist of well-stratified silt, sand, and gravel. Glacial outwash deposits are characterized by interstratified fluvial sand and gravel (as above) and poorly stratified, poorly sorted, mudflow and debris-flow sequences. Pediment-associated deposits are usually very poorly stratified and were deposited my various mass-wasting processes (mainly debris flows and mudflows), with some fluvial reworking.

Ten terrace levels are present between the towns of Hotchkiss and Whitewater, with the oldest being at the highest elevation. Determining the absolute ages for the terrace-gravel deposition is problematic. The only extensive time marker is the Lava Creek B tephra (dated at ~ 640 ka) at two of pediment-associated terraces (Petrie Mesa and Paradox Mesa) and an in alluvial gravel of the ancestral Uncompahgre River near Delta. Overall, the chronological data suggest that the oldest (highest) terrace remnants formed in the Pliocene, whereas the youngest (lowest) terrace remnants are late Holocene. Most appear to have formed between 12 and 700 ka.

This presentation will highlight the following topics:

- Field methodology used to determine depositional processes.
- Mathematical characterization of terrace profiles to determine relative ages.
- Correlation of terraces flanking Grand Mesa with alluvial terraces associated with the Colorado, Gunnison, and North Fork Rivers.
- The use of terrace elevations to estimate incision rates of the Gunnison and Colorado Rivers over the last several million years.
- Tentative correlation of episodes of terrace formation with the glacial-interglacial history of Colorado.
- Evidence that several terraces show post-depositional tilting due to localized Late Neogene uplift of the flank of the Uncompahgre Plateau between Escalante and Bridgeport.


# Bio

Rex Cole is a third-generation Colorado native, born and raised in Delta, CO. He received his A.S. Degree in Geology from Mesa College, his B.S. in Geology from Colorado State University, and a Ph.D. in Geology from the University of Utah. During graduate school, he was employed by Duval Corp., Inspiration Development Corp., and Asarco Corp. doing mineral exploration in Washington, Utah, Nevada, Idaho, and Montana. Following grad school, he briefly became an Assistant Professor of Geology at Southern Illinois University, Carbondale. However, the terrain and climate of the Midwest prompted a return to western Colorado where he was employed by Bendix Field Engineering (uranium and thorium) as a research geologist, followed by Multi-Mineral Corp. (oil shale and saline-mineral research and development). Between 1982 and 1995, he was employed as a research sedimentologist by Unocal Corporation. This career stage involved numerous projects in northern Alaska, northwest Canada, southern California, the Rocky Mountains, and Gulf Coast, plus development of geologic field trips in Utah, Colorado, Nevada, Arizona, and California. In 1995, Cole left Unocal to become an Associate Professor of Geology at Mesa State College, later becoming a Professor of Geology at Colorado Mesa University (CMU). During this stage (25 years) he taught numerous undergraduate geology courses and conducted sedimentological research on oil shale, Cretaceous strata in western Colorado and eastern Utah, and, of course, on Grand Mesa. He retired from CMU in 2020 and is now has emeritus status. He is a member of the Geological Society of America (Chair of Rocky Mountain Section in 2005), the Grand Junction Geological Society (past president and honorary life member), and the New Mexico Geological Society.