Grand Junction Geological Society

http://www.gjgs.org/

This Month's Presentation

David Gonzales, PH.D.

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Will present a talk on

A 75 Ma Chronicle of Magmatism in the Western San Juan Mountains, Colorado

Co-author: Hannah Sulas
Fort Lewis College

Weather permitting, the speaker will present in person although we will also have Zoom available.

Guests Are Always Welcome

Abstract and Speaker's Bio Are on The Next Page.

Meeting Time and Location

March 25 2026

Joint meeting with the CMU Geology Students

6:30 p.m.

Saccomanno Lecture Hall (Room 141) in the Wubben Science Building at Colorado Mesa University

Zoom Details

Andres Aslan is inviting you to a Zoom meeting.

Topic: GJGS March meeting

Time: Mar 25, 2026 06:00 PM Mountain Time

Join Zoom Meeting

https://coloradomesa.zoom.us/j/86586768592

Meeting ID: 865 8676 8592

Join instructions

https://coloradomesa.zoom.us/meetings/86586768592/invitations?signature=N3YTUvWr-B4lJ1Gwv6Ke_5lq7YiznbQONsP1L-2i-FE

Important Announcements

Note the date! CMU is on break on our usual date.

We are in the process of updating the membership information for a possible new directory. If you are a paid-up member and have changed address or phone number since the 2020 directory, please send me an email with the new information.
Bill

Abstract

A 75 Ma Chronicle of Magmatism in the Western San Juan Mountains, Colorado

David Gonzales and Hannah Sulas

The western San Juan Mountains (WSM) expose 75 to 3 Ma plutonic rocks that formed across the transition from regional Laramide compression to post-Eocene extension. Understanding the genesis and history of these plutonic rocks is crucial to unraveling the magmatic record and its alliance with mineralization and mountain building. We present a collection of data that provide insight into the history and evolution of the WSM chronicle of magmatism.

Plutons in the WSM are focused on a northeast trend that is broadly aligned with the southern extent of the Colorado Mineral Belt. Laramide plutons and 25-4 Ma alkaline mafic rocks decrease in age to the northeast whereas intrusive rocks emplaced from 27 to 3 Ma are clustered in the central WSM.

Pre-25 Ma plutonic rocks in the WSM are mostly diorite and granodiorite with abundant inherited Proterozoic zircons. In contrast, post-23 Ma intrusive rocks contain little to no inherited zircons and are defined by a larger percentage of high-silica felsic rocks (syenite and granite) that were coeval with widespread production of 25-4 Ma alkaline mantle melts. Bulk-rock geochemical data indicate 75-3 Ma plutonic rocks are potassic calc-alkaline to alkaline and have arc signatures regardless of composition or tectonic regime under which they formed.

Whole-rock (Sr-Nd) and zircon (Lu-Hf) isotopic signatures reveal a higher crustal contribution to magma production after 23 Ma. This input of "continental" crust is distinguished by $^{87}Sr/^{86}Sr > 0.706$ and $\varepsilon_{Hf}(t)$ and $\varepsilon_{Nd}(t)$ values greater than -5. The variation and trends in the isotopic signatures along with zircon inheritance are consistent with melting of different Proterozoic basement rocks. Crustal contamination and magma mixing cannot be ruled out but there is a lack of evidence to support this process.

The 75-3 Ma magmas in the WSM were placed in a zone of deep-seated lineaments with Proterozoic ancestry. Production of alkaline mantle melts generated at various times invaded and melted the 1800-1400 Ma lithosphere. We postulate that magma production involved mixed mantle-crustal sources with a higher proportion of felsic magmas after 23 Ma, a shift that coincides with the close alliance of high-silica crustal melts with alkaline mafic rocks. The higher thermal flux in this period might explain the lower Proterozoic zircon inheritance due to resetting of radiogenic systems at temperatures greater than 850 C.

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Bio

David Gonzales

I received a Ph.D. in geology at The University of Kansas after completing degrees from Fort Lewis College (BS) and Northern Arizona University (MS). Since 1997 I have served as a professor at Fort Lewis College in the Department of Geosciences. Most of my academic and professional career have involved research in southwestern Colorado focused on Proterozoic evolution and post-75 Ma magmatism with combined field and analytical studies.

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Major shifts in magma composition and sources in the WSM also align with diverse types of mineralization. Diorite to granodiorite magmas generated before 25 Ma are associated with local skarn mineralization and minor polymetallic veins. After 23 Ma, intrusive rocks are closely related in time and space with polymetallic base and precious metal veins and replacement deposits, possibly due to a greater influx of melts from the lithospheric mantle (SCLM) laden with metals and volatiles.