COLORADO STATE UNIVERSITY EXTENSION

Paleosatellite Mapping: Colorado's Landscape Through Deep Time

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Abstract

This project combines geospatial analysis, digital illustration, and paleogeographic research to create visual reconstructions of Colorado during the late Eocene to early Miocene (34–20 Ma). Using ArcGIS Pro, Adobe Illustrator, and Photoshop, I synthesized online geologic datasets and published literature to depict a dynamic landscape shaped by extensive volcanism resulting from transformative regional tectonism. The resulting visualizations of the Colorado Plateau and surrounding states highlight a chapter in Earth's history, when the region was dominated by diverse volcanic centers, including one of the largest volcanic deposits in history: the Fish Canyon Tuff produced by the La Garita Caldera of the San Juans. These reconstructions aim to bridge scientific understanding and public engagement by illustrating a Colorado vastly different from its modern form: a terrain of active caldera systems, lava flows, and ashfall deposits that reveal the relationship between ancient volcanism and the creation of the region's modern geologic form.

Objectives

- To reconstruct the paleogeography of Colorado and the surrounding region during the late Eocene to early Miocene (34–20 Ma).
- To create detailed, open-access,scientifically accurate visualizations of Colorado landscapes through deep time, based on geologic and paleotopographic data.
- To enhance public understanding of Colorado's volcanic past, particularly the scale and impact of events like the Fish Canyon Tuff eruption.
- To enhance public understanding of Colorado geologic history, including by drawing the connection between the magmatic source of tectonic uplift that both instigated volcanism in the region and helped create the modern Rocky Mountains.

Methods

- Conducted literature review and online research to compile geologic maps, stratigraphic data, and paleoelevation models relevant to the 34–20 Ma time interval.
- Used **ArcGIS Pro** to spatially analyze and organize geologic data across temporal slices.
- Designed high-resolution paleolandscape reconstructions in **Adobe Illustrator** and **Photoshop**, integrating digital elevation data and inferred volcanic features.
- Cross-referenced reconstructions with peer-reviewed studies and existing paleogeographic maps to ensure scientific accuracy.

Future Goals

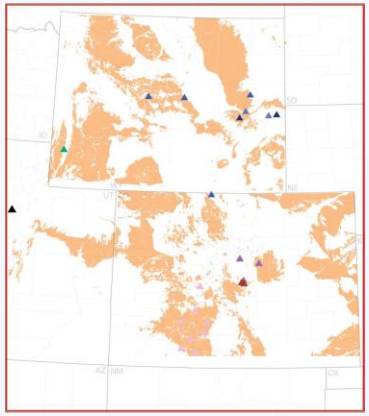
- Develop accessible **lesson plans and educational resources** centered on the reconstructed paleogeographic maps, with an emphasis on integrating visual learning into geoscience education.
- Collaborate with educators to align materials with **curriculum standards** at the middle school, high school, and introductory college levels.
- Adapt visual content for use in **informal science settings**, such as museums, visitor centers, and online platforms, to increase public engagement with Colorado's volcanic past.
- Explore opportunities for **interactive media development**, including web-based map layers or augmented reality experiences, to bring these reconstructions to life for broader audiences.

References

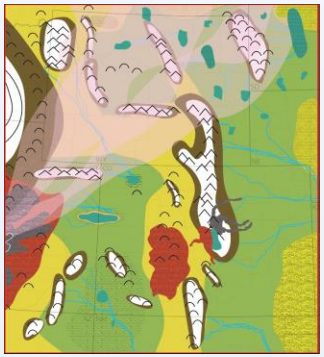
Petermann, Holger, et al. "Paleomapping: Creating testable visual hypotheses of ancient worlds." *Journal of Palaeogeography*, vol. 14, no. 1, Jan. 2025, pp. 91–104.

Blakey, Ronald C., and Wayne D. Ranney. *Ancient Landscapes of Western North America*, 2018.

Process Steps & Results



1) Outcrop map showing known Eocene geologic facies (orange) and datapoints representing literature describing relevant rock units.



2) "Cartoon" rendering of paleoenvironment – proto-map illustrated before the creation of the final paleosatellite image for public consumption

3) First draft of paleosatellite map representing relevant geography and climate at 34 Ma.

4) Example of completed paleosatellite map from 110 Ma (Early Cretaceous). As of August 2025, the 34 Ma Eocene map is in progress.

Contact Information

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