

Contact Information

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Education

B.A. Geology, Carleton College, Northfield, MN [1999]
Field Camp, University of Wisconsin-Madison [1999]
M.S. Geology, University of Wisconsin-Madison [2002]
Ph.D. Geology, University of Wisconsin-Madison [2007]
Advisors: Dr. Alan R. Carroll and Dr. Brad S. Singer - Minor: Geography

Appointments

Professor, Northern Arizona University, Flagstaff, AZ [2025-present]
Associate Professor with tenure, Northern Arizona University, Flagstaff, AZ [2019-2025]
Assistant Professor, Northern Arizona University, Flagstaff, AZ [2014-2019]
Associate Professor with tenure, Sonoma State University, Rohnert Park, CA [2013-2014]
Assistant Professor, Sonoma State University, Rohnert Park, CA [2007-2013]
Visiting Professor, University of Montana, Missoula, MT [2006-2007]
Visiting Instructor, Carleton College, Northfield, MN [Fall 2004]

Service

Associate Director, NAU School of Earth and Sustainability [2022-present]
CEFNS Faculty Senator [2016-2020, 2023-present]
Chair, Geology Undergraduate Committee, Northern Arizona University [2018-present]
Associate Editor, Geological Society of America Bulletin [2016-present]
International Association of Limnology board member [2015-present] and treasurer [2021-present]
Field Trip Chair, Geological Society of America Flagstaff Sectional Meeting [2018]
Chair, Sonoma State University General Education subcommittee [2010-2014]
Field trip leader: International Limnogeology Congress [Summer 2015]

Teaching *Over 3000 students taught over 18 years of experience as a faculty member*

Northern Arizona University [2014-present]: ~4 graduate and undergraduate courses/year, including:

GLG 101 Physical Geology
GLG 324 Sedimentology and Stratigraphy
GLG 627 Depositional Systems
GLG 625 Sedimentary Petrology
GLG 350W Intermediate Field Geology and Report Writing
GLG 440C Advanced Field Geology
EES 698 Graduate seminars and field courses.

Sonoma State University [2007-2014]: ~5 undergraduate courses/year, including:

GEOL 102 Introductory Geology
GEOL 110 Natural Disasters
GEOL 120 Regional Field Geology
GEOL 302 Geology of Climate Change
GEOL 304 Geologic Mapping and Report Writing
GEOL 309 Computer Applications in Geology
GEOL 311-312 Sedimentary Geology
GEOL 420 Integrative Field Experience

University of Montana [2006-2007]: 6 graduate and undergraduate courses, including:

GEOL 100 General Geology

GEOL 226 Earth Materials

GEOL 485 Geomorphology

GEOL 485 GIS and Geology

GEOL 587 Graduate Seminar: Paleoclimate, Geomorphology and Orogeny

Carleton College [2004]: GEOL 260 Sedimentology and Stratigraphy

Student Research Advisees

Northern Arizona University: (*projects in italics*)

Brianna McMaster-Smith (MS, 2024) *Geochemical provenance and tectonic evolution of the Green River Formation paleolakes, Western Wyoming.*

Emma Palko (MS, 2023) *Paleolimnology and geochronology of the Wagon Bed Formation of Central Wyoming record a late-Laramide tectonic shift to extension following Farallon slab removal.*

Rachel Forney (MS, 2023) *Mogollon Highlands paleogeographic reconstruction using the Paleogene Rim Gravels, Arizona and New Mexico.*

Eric Stauffer (MS, 2022) *Astrochronology and stable isotope geochemistry of the Pennsylvanian-Permian Keeler Canyon Formation, eastern California.*

Kelly Vote (MS, 2020) *Chemostratigraphy and lithofacies of a cyclic mixed carbonate-siliciclastic deep-water succession, Pennsylvanian-Permian Keeler Canyon Formation, eastern California.*

Sarah Joerger (MS, 2020) *A tale of two canyons: Tracking the effects of littoral sediment transport and wave transformation over submarine canyons, northern California.*

Emily Mason (BS, 2019) *Geochemistry and $^{40}\text{Ar}/^{39}\text{Ar}$ geochronology of Eocene ash beds, Duchesne River Formation, Uinta Basin, Utah.*

Patrick Gannon (MS, 2019) *Late Paleozoic deep marine cyclostratigraphy and tectonic evolution of the Keeler Basin, California, southwest Laurentia*

Lindsey Gipson (MS, 2019) *Fluvial and lacustrine stratigraphy of the upper Wilkins Peak Member of the Green River Formation, SW Wyoming.*

Sam Werner (MS, 2017) *Linking the land to the sea: Tracking fluvial bedload from coastal tributaries to Delgada submarine canyon, northern California.*

Rachel Krueger (MS, 2017) *Stratigraphy, provenance, and paleo-fluvial geomorphology of the Green River Formation, Wyoming.*

Elizabeth Johnson (MS, 2017) *Photogrammetric visualization of mixed clastic-carbonate Pennsylvanian cyclothems, Paradox Basin, Utah.*

Katie Chapman (MS, 2017) *Determining the tributary sediment contribution to experimental flood deposits on the Colorado River in Marble Canyon, Grand Canyon, Arizona.*

Carolyn Box (BS, 2016) *$^{40}\text{Ar}/^{39}\text{Ar}$ geochronology of Eocene ash beds, Cordilleran hinterland, western North America.*

Kiley Sheehan (BS, 2017) *Provenance of modern and Eocene streams, northern Uinta Mountains.*

Sonoma State University: (*undergraduate students, projects in italics*)

Rebekah Cesmat, Tracy Riedel, Sam Werner, Devon Jorgenson, Carley Dunleavy & Natalia Chavez *Quantifying aeolian sediment transport in a coastal dune field, Bodega Marine Reserve, California.*

Russel DiFiori, Chris Davidson, Chase Glenister & Andrew Canada: *Fluvial, littoral, and submarine gravel transport, King Range, Northern California.*

Jason Hoefer: *Provenance and fluvial geomorphology of gravel bedded streams, central Idaho.*

Emily White & Bianca Baggenstos: *$^{40}\text{Ar}/^{39}\text{Ar}$ geochronology and stratigraphy of Elko Basin ash beds.*

Peer-reviewed Publications On Oct 1, 2025: 51 published works; h-index = 28; 3024 citations

<https://scholar.google.com/citations?user=CBG7OuAAAAAJ&hl=en>

*NAU student authors

In preparation or review

- *Stauffer, E., *Vote, K., Smith, M.E., in press, Cyclostratigraphy and isotope stratigraphy of the Keeler Canyon Formation, SE California and southern Nevada: *GSA Bulletin*.
- *Palko, E.M, Smith, M.E., Jicha, B., in review, Early Eocene extension of the central Wyoming: Wagon Bed Formation: *Geology*.
- *McMaster-Smith, B., Smith, M.E., Carroll, A.R., in prep, Strontium isotopic evidence that Fossil Lake began as an embayment of paleolake Gosiute, SW Wyoming: *Geology*.
- *Forney, R., Smith, M.E., in prep, A detrital record of crustal thickening of the Arizonaplano from zircon geochronology and trace elements in detrital zircon in Mogollon Rim Gravels, Arizona and New Mexico: *Geology*.

2024

- *Joerger, S., Smith, M.E., Buscombe, D., Mueller, E.R., 2025, Evidence for littoral convergence and sediment delivery to Mattole submarine canyon, Northern California: *Frontiers in Earth Science*, v. 12, doi: 10.3389/feart.2024.1377997
- Thoresen, H.E., Cassel, E.J., and Smith, M.E., 2024, Stratigraphic and geochronologic investigation of the Muddy Creek Basin: Implications for the Eocene tectonic evolution of southwest Montana, USA: *GSA Bulletin*, doi: 10.1130/B37268.1/634683.
- Parrish, E.C., Carroll, A.R., *Gregorich, H., Smith, M.E., and Schwaderer, C., 2024, Watershed-scale provenance heterogeneity within Eocene nonmarine basin fill: Southern Greater Green River Basin, western USA: *GSA Bulletin*, v. 136, p. 1787–1807.

2023

- Smith, M.E.; *Gregorich, H.G.; *Gipson, L.A.; *Krueger, R.C.; Carroll, A.R.; Parrish, E.C.; Walters, A.P.; Honig, S.; Schwaderer, C.; Meyers, S.; Singer, B.S.; Lowenstein, T.K.; Arnuk, W.D., 2023, High-resolution X-ray fluorescence-based provenance mapping of Eocene fluvial distributary fans that fed ancient Gosiute Lake, Wyoming, USA: *GSA Bulletin*, doi:10.1130/B37207.1.
- Arnuk, W.D., Lowenstein T.K., Klonowski, E.M., Carroll, A.R., Smith, M.E., 2023, Simulating the source waters for the Wilkins Peak Member evaporite sequence with modern soda spring analogues: *Applied Geochemistry*, v. 151, 105597.

2022

- Leary, R.J., Smith, M.E., Umhoefer, P.J., 2022, Mixed eolian–longshore sediment transport in the late Paleozoic Arizona shelf and Pedregosa basin, USA: A case study in grain-size analysis of detrital-zircon datasets: *Journal of Sedimentary Research*, v. 92, p. 676-694.
- *Gannon, P., Smith, M.E., Umhoefer, P.J., 2022, High-resolution Late Paleozoic cyclostratigraphy and tectonic evolution of the Keeler Basin, California, southwest Laurentia: *GSA Bulletin*, doi: 10.1130/B36027.1
- Klonowski, E., Lowenstein, T., Carroll, A., Smith, M.E., Paperini, M., Pietras, J., 2022, Recurring lacustrine depositional successions in the Wilkins Peak Member, Green River Formation: The basin-center evaporite perspective: *Utah Geological Association Publication* 50, p. 1-23.

2021

- Canada, A.S., Cassel, E.J., Smith, M.E., 2021, Geochemical evolution of Eocene lakes in the Nevada hinterland of the North American Cordillera: *Geochemistry, Geophysics, Geosystems*, v. 22, e2021GC009863.
- *Dobbs, S.C., Riggs, N.R., Marsaglia, K.M., González-León, C.M., Cecil, M.R., Smith, M.E., 2021, The Permian Monos Formation: Stratigraphic and detrital zircon evidence for Permian Cordilleran arc development along the southwestern margin of Laurentia (northwestern Sonora, Mexico): *Geosphere*, v. 17, p. 520-537.
- *Johnson, E., Smith, M.E., Giannini, G., Umhoefer, P., 2021, Photogrammetry of sequence and bioherm morphology within the Paradox Formation, Utah: A test of the magnitude and coherence of

- Pennsylvanian (Moscovian) glacio-eustatic sea level change: *Journal of Sedimentary Research*, v. 91, p. 833-846.
- Stein, R.A., Sheldon, N.D., Allen, S.E., Smith, M.E., Dzombak, R.M., Jicha, B.R., 2021, Climate & ecology in the Rocky Mountain interior after the Early Eocene Climatic Optimum: *Climate of the Past*, p. 1-42.
- *Chapman, K.A., Best, R.J., Smith, M.E., Mueller, E.M., Grams, P.E., Parnell, R.A., 2021, Estimating the contribution of tributary sand inputs to controlled flood deposits for sandbar restoration using elemental tracers, Colorado River, Grand Canyon National Park, Arizona: *GSA Bulletin*, v. 133, p. 1141-1156.

2020

- *Canada, A., Cassel, E.J., Stockli, D., Smith, M.E., Jicha, B.R., Singer, B.S., 2020, Accelerating exhumation in the Eocene North American Cordilleran hinterland: Implications from detrital zircon (U-Th)/(He-Pb) double dating: *GSA Bulletin*, v. 132, p. 198–214.
- Leary, R.J., Umhoefer, P.J., Smith, M.E., Smith, T.M., Saylor, M.E., Riggs, N.R., *Burr, G., *Lodes, E., *Foley, D., Licht, A., Mueller, M.A., Baird, C., 2020, Provenance of Pennsylvanian–Permian sedimentary rocks associated with the Ancestral Rocky Mountains orogeny in southwestern Laurentia: Implications for continental-scale Laurentian sediment transport systems: *Lithosphere*, v. 12, p. 88-121.
- Leary, R.J., Smith, M.E., Umhoefer, P.J., 2020, Grain-size control on detrital zircon cycloprovenance in the Late Paleozoic Paradox and Eagle Basins, USA: *JGR Solid Earth*, v. 15, 19 p.
- *Lodes, E., Riggs, N.R., Smith, M.E., Stone, P., 2020, Cordilleran Subduction Initiation: Retroarc timing and basinal response in the Inyo Mountains, Eastern California: *Lithosphere*, doi: 10.2113/2020/9406113

2019

- *Canada, A., Cassel, E.J., McGrew, A., Smith, M.E., Stockli, D., Foland, K., Jicha, B.R., Singer, B.S., 2019, Eocene exhumation and extensional basin formation in the Copper Mountains, Nevada, USA: *Geosphere*, v. 15, p. 1-21.
- Hammond, A.P., Carroll, A.R., Parrish, E.C., Smith, M.E., Lowenstein, T.K., 2019, The Aspen paleoriver: Linking Eocene magmatism to the world's largest Na-carbonate evaporite (Wyoming, USA): *Geology*, v. 47, p. 1,020-1,024.

2018

- Cassel, E.J., Smith, M.E., and Jicha, B.R., 2018, The impact of slab rollback on Earth's surface: Uplift and extension in the hinterland of the North American Cordillera: *Geophysical Research Letters*, v. 45, 10,996-11,004.
- Smith, M.E., *Werner, S.H., Buscombe, D., Finnegan, N.J., Sumner, E.S., Mueller, E.R., 2018, Seeking the shore: Evidence of active submarine canyon head incision due to coarse sediment supply and canyon focusing of wave energy: *Geophysical Research Letters*, v. 45, 12,403-12,413.

2017

- Smith, M.E., Finnegan, N.J., Mueller, E.R., and Best, R.J., 2017, Durable terrestrial bedrock predicts submarine canyon formation: *Geophysical Research Letters*, v. 44, p. 10,332-10,340.
- Smith, M.E., Cassel, E.J., Jicha, B.R., Singer, B.S., *Canada, A., 2017, Hinterland drainage closure and lake formation in response to middle Eocene Farallon slab removal, Nevada, U.S.A., *Earth and Planetary Science Letters*, v. 479, p. 156-169.
- Lowenstein, T.K., Jagniecki, E.A., Carroll, A.R., Smith, M.E., Renaut, R.W., Owen, R.B., 2017, The Green River salt mystery: What was the source of the hyperalkaline lake waters?: *Earth-Science Reviews*, v. 173, p. 295-306.
- Leary, R., Umhoefer, P.J., Smith, M.E., Riggs, N.R., 2017, A three-sided orogen: a new tectonic model for Ancestral Rocky Mountain uplift and basin development: *Geology*, v. 45, p. 735-738.

2016

- Mueller, E.M., Smith, M.E., and Pitlick, J., 2016, Lithology-controlled evolution of stream bed sediment and basin-scale sediment yields in adjacent mountain watersheds, Idaho, USA: *Earth Surface Processes and Landforms*, v. 41, p. 1869-1883.

2015

- Smith, M.E. and Carroll, A.R., 2015, Introduction to the Green River Formation, *in* Smith, M.E. and Carroll, A.R., eds., *Stratigraphy and Paleolimnology of the Green River Formation, Western USA*: Springer, p. 1-12.
- Norsted, B.A., Carroll, A.R., and Smith, M.E., 2015, Initiation of Eocene lacustrine sedimentation in the Greater Green River Basin: Luman Member of the Green River Formation, *in* Smith, M.E. and Carroll, A.R., eds., *Stratigraphy and Paleolimnology of the Green River Formation, Western USA*: Springer, p. 13-30.
- Graf, J.W., Carroll, A.R., Smith, M.E., 2015, Lacustrine sedimentology, stratigraphy and stable isotope geochemistry of the Tipton Member of the Green River Formation, *in* Smith, M.E. and Carroll, A.R., eds., *Stratigraphy and Paleolimnology of the Green River Formation, Western USA*: Springer, p. 31-60.
- Smith, M.E., Carroll, A.R., Scott, J.J., 2015, Stratigraphic expression of climate, tectonism, and geomorphic forcing in an underfilled lake basin: Wilkins Peak Member of the Green River Formation, *in* Smith, M.E. and Carroll, A.R., eds., *Stratigraphy and Paleolimnology of the Green River Formation, Western USA*: Springer, p. 61-102.
- Scott, J.J., Smith, M.E., 2015, Trace fossils of the Eocene Green River lake basins, Wyoming, Utah, and Colorado, *in* Smith, M.E. and Carroll, A.R., eds., *Stratigraphy and Paleolimnology of the Green River Formation, Western USA*: Springer, p. 311-348.
- Smith, M.E., Jicha, B.R., Carroll, A.R., Cassel, E.J., and Scott, J.J., 2015, Paleogeographic record of Eocene Farallon slab rollback beneath western North America: Reply to Discussion: *Geology*, v. 43, p. e364.

2014

- Smith, M.E., Jicha, B.R., Carroll, A.R., Cassel, E.J., and Scott, J.J., 2014, Paleogeographic record of Eocene Farallon slab rollback beneath western North America: *Geology*, v. 42, p. 1039-1042.
- Smith, M.E., Carroll, A. R., Scott, J.J., and Singer, B.S., 2014, Early Eocene carbon isotope excursions and landscape destabilization at eccentricity minima: Green River Formation of Wyoming: *Earth and Planetary Science Letters*, v. 403, p. 393-406.

2013

- Aswasereelert, W., Meyers, S.R., Carroll, A.R., Peters, S.E., Smith, M.E., and Feigl, K.L., 2013, Integrated macrostratigraphy and cyclostratigraphy of Eocene lacustrine strata, Wilkins Peak Member of the Green River Formation, Wyoming: *Geological Society of America Bulletin*, v. 125, p. 216-228.

2011

- Smith, M.E., Singer, B.S., Simo, T., 2011, A time like our own? Radioisotopic calibration of the Ordovician greenhouse to icehouse transition: *Earth and Planetary Science Letters*, v. 311, p. 364-374.

2010

- Smith, M.E., Chamberlain, K.R., Singer, B.S., and Carroll, A.R., 2010, Eocene clocks agree: Coeval $^{40}\text{Ar}/^{39}\text{Ar}$, U-Pb, and astronomical ages from the Green River Formation: *Geology*, v. 38, p. 527-530.
- Carroll, A.R., Graham, S.A., Smith, M.E., 2010, Walled sedimentary basins of China: *Basin Research*, v. 22, p. 17-32.

2008

- Smith, M.E., Carroll, A.R., and Mueller, E.R., 2008, Elevated weathering rates in the Rocky Mountains during the Early Eocene Climatic Optimum: *Nature-Geoscience*, v. 1, p. 370-374.
- Smith, M.E., Singer, B.S., Carroll, A.R., and Fournelle, J.H., 2008, Precise dating of biotite in distal volcanic ash: isolating subtle alteration using $^{40}\text{Ar}/^{39}\text{Ar}$ laser incremental heating and electron microprobe techniques: *American Mineralogist*, v. 93, p. 784-795.
- Smith, M.E., Carroll, A.R., and Singer, B.S., 2008, Synoptic reconstruction of a major ancient lake system: Eocene Green River Formation, Western United States: *Geological Society of America Bulletin*, v. 12, p. 54-84.

Carroll, A.R., Doebbert, A.C., Booth, A.L., Chamberlain, C.P., Rhodes-Carson, M.K., Smith, M.E., Johnson, C.M., Beard, B.L., 2008, Capture of high-altitude precipitation by a low-altitude Eocene lake, western U.S., *Geology*, v. 36, p. 791-794.

2007

Rhodes, M.K., Malone, D.H., Carroll, A.R., Smith, M.E., 2007, Sudden desiccation of Lake Gosiute at ~49 Ma: A downstream record of Heart Mountain faulting? *The Mountain Geologist*, v. 44, p. 1-10.

2006

Smith, M.E., Singer, B.S., Carroll, A.R., and Fournelle, J.H., 2006, High-resolution calibration of Eocene timescales: $^{40}\text{Ar}/^{39}\text{Ar}$ geochronology of biotite in the Eocene Green River Formation: *Geology*, v. 34, p. 393-396.

Secord, R., Gingerich, P.D., Smith, M.E., and Wilf, P., Singer, B.S., 2006, Geochronology and mammalian biostratigraphy of middle and upper Paleocene continental strata, Bighorn Basin, Wyoming: *American Journal of Science*, v. 306, p. 211-245.

Carroll, A.R., Chetel, L., and Smith, M.E., 2006, Feast to Famine: Sediment Supply Control on Laramide Basin Fill: *Geology*, v. 34, p. 197-200.

2005

Wilf, P., Johnson, K., Cuneo, N.R., Smith, M.E., Singer, B.S., and Gandolfo, M.A., 2005, Eocene Plant Diversity at Laguna del Hunco and Rio Pichileufu, Patagonia, Argentina: *The American Naturalist*, v. 165, p. 634-650.

2004

Smith, M.E., Singer, B.S., Carroll, A.R., 2004, Reply: $^{40}\text{Ar}/^{39}\text{Ar}$ geochronology of the Green River Formation, Wyoming: *Geological Society of America Bulletin*, v. 116, no. 1, p. 253-256.

2003

Smith, M.E., Singer, B.S., Carroll, A.R., 2003, $^{40}\text{Ar}/^{39}\text{Ar}$ geochronology of the Green River Formation, Wyoming: *Geological Society of America Bulletin*, v. 115, p. 549-565.

Pietras, J.T., Carroll, A.R., Singer, B.S., and Smith, M.E., 2003, 10 k.y. depositional cyclicity in the early Eocene: Stratigraphic and $^{40}\text{Ar}/^{39}\text{Ar}$ evidence from the lacustrine Green River Formation: *Geology*, v. 31, p. 593-596.

Funded Research

Long Term Monitoring of Sediment Resources and Channel Substrates of the Colorado River in Grand Canyon National Park. USGS [2024-2025, \$99,320, *PI*].

Collaborative Research: Green River Eocene Earth and Climate Observatory (GREECO). NSF Integrated Earth Systems [2018-2023, \$190,156, *PI*].

Multibeam sonar mapping of a submarine canyon to track gravel from the mountains to the deep sea. NAU Faculty Grants Program [2015-2016, \$14,969, *PI*].

Collaborative Research: Paleogeographic record of contractional to extensional tectonics in the Cordilleran hinterland, Nevada. NSF Tectonics [2013-2016, \$94,943, *PI*].

S³: STEPping Up STEM at Sonoma State University. NSF Division Of Undergraduate Education [2011-2014; \$987,153, *faculty contributor*].

Quantifying the temporal evolution of Eocene Lake Gosiute. [2003-2006, \$268,003, *primary proposal author & PhD student researcher, first author on 12 publications resulting from this project*].

GSA Student Research Grant [2002], AAPG Student Research Grant [2001]

GSA Student Research Grant [2000], Sigma Xi Student Research Grant [2000]

Honors & Awards

Bill R. Dickinson Award (SEPM) for Mid-career Excellence in Sedimentary Geology [2024]

Geological Society of America Fellow [2018]

Sonoma State University Summer Research Fellowship [2013]

Sonoma State University Summer Research Fellowship [2011]

Baily Distinguished Graduate Student Fellowship [2005-2006]

UW-Madison Geology and Geophysics Best Student Paper Award [2003 & 2008]

N.A.G.T. Summer Field Training Program, Nominated [1999]
National Merit Scholarship, Carleton College [1995-1999]

Invited Talks

Washington State University (2023) Department Seminar
University of Nevada Las Vegas (2017) Department Seminar
Loma Linda University (2016) Department Seminar
International Limnogeology Congress (2015) Plenary Lecture
University of Idaho (2015) Department Seminar
Oregon State University (2014) Department Seminar
Northern Arizona University (2014) Department Seminar
University of California, Santa Cruz (2013) Department Seminar
Stanford University (2009) Sedimentary Research Group Seminar
Sonoma State University (2006) Department Seminar
Chico State University (2006) Department Seminar

Conference Abstracts student authors underlined

Smith, M.E., Carroll, A.R., Walters, A., Schmitz, M., Singer, B., 2024, Eccentricity-paced Early Eocene hyperthermal events coeval with expansions of hypersaline Gosiute Lake, Green River Formation, WY. *GSA 2024 Annual Meeting*.

Smith, M.E., Gregorich, H., Gipson, L., Krueger, R., Carroll, A.R., Honig, S., Parrish, E.C., Schwaderer, C., 2022, High-resolution provenance mapping of cyclic Eocene fluvial fans that fed ancient Lake Gosiute, Wyoming. *GSA 2022 Annual Meeting*.

Arnuk, W.D., Lowenstein, T.K., Klonowski, E., Carroll, A.R., Smith, M.E., 2022, Simulating source waters for the Wilkins Peak Member evaporites with modern soda spring analogues. *GSA 2022 Annual Meeting*.

Parrish, E.C., Carroll, A.R., Gregorich, H., Smith, M.E., Schwaderer, C., 2022, Watershed-scale provenance heterogeneity within nonmarine basin fill: Greater Green River Basin, western U.S. *GSA 2022 Annual Meeting*.

Gregorich, H.G., Smith, M.E., Carroll, A.R., and Parrish, E., 2021, High spatial-resolution provenance discrimination of siliciclastic marker beds of the Wilkins Peak Member of the Green River Formation, Wyoming. *GSA 2021 Annual Meeting*.

Cassel, E.J., Smith, M.E., Young-Dahl, E., and Brecker, D.O., 2021, Profile of a Paleogene Andes in the North American West. *GSA 2021 Annual Meeting*.

Smith, M.E., and Cassel, E.J., 2021, Do lacustrine inundation patterns record early extension in the Laramide foreland province? Insights from comparisons with modern basement elevations. *GSA 2021 Annual Meeting*.

Parrish, E., Carroll, A.R., Smith, M.E., 2021, A tale of two rivers: Fluvial records of competing moisture sources in a broken Eocene foreland. *2021 Annual Meeting*.

Carroll, A.R., Gregorich, H., Hammond, A.P., Honig, S., Parrish, E., Schwaderer, C., and Smith, M.E., 2021, Chronofacies convergence and dynamic drainage evolution in an Eocene broken foreland: Bridger Basin, Wyoming, USA. *2021 Annual Meeting*.

Smith, M.E., Gipson, L.A., Krueger, R., and Carroll, A.R., 2019, Provenance mapping the Eocene rivers that fed a Green River Formation lake using sandstone petrography and handheld XRF analysis. *GSA 2019 Annual Meeting*.

Gannon, P.J., Smith, M.E., and Umhoefer, P.J., 2019, High resolution Late Paleozoic cyclostratigraphy of the Keeler Basin, Inyo Mountains, California, southwest Laurentia. *GSA 2019 Annual Meeting*.

Smith, M.E., Cassel, E.J., Jicha, B.R., 2018, Early Cenozoic mantle driven drainage disruption and lake formation in the North American Cordilleran hinterland and foreland. *GSA 2018 Annual Meeting*.

Smith, M.E., 2018, Mantle driven drainage disruption and lake basin formation in the North American Cordilleran hinterland. International Limnogeology Congress, Stockholm, Sweden.

Smith, M.E., Finnegan, N.J., Mueller, E.R., 2016, Terrestrial geology and catchment slope promote submarine canyon headwall incision. *GSA 2016 Annual Meeting*.

- Burr, G.L.E., Smith, M.E., Umhoefer, P.J., 2016, Provenance of Desmoinesian to early Wolfcampian strata in the Paradox and Eagle basins, Ancestral Rocky Mountains. *GSA 2016 Annual Meeting*.
- Johnson, E.A., Gianniny, G.L., Smith, M.E., Umhoefer, P.J., 2016, A photogrammetric reevaluation of shared accommodation caused by bioherm occurrence in the Desmoinesian Hermosa Group, Paradox Basin, Utah. *GSA 2016 Annual Meeting*.
- Krueger, R., Smith, M.E., 2016, Provenance-calibrated fluvial response to warming during the early Eocene climatic optimum, Bridger basin, Wyoming. *GSA 2016 Annual Meeting*.
- Cassel, E.J., Smith, M.E., Canada, A.C., Stockli, D.F., 2016, A multi-proxy study of topography and sediment provenance across the Eocene Cordilleran hinterland. *GSA 2016 Annual Meeting*.
- Werner, S.H., Smith, M.E., 2016, Linking the land to the sea: Tracking fluvial bedload from coastal watersheds to Delgada submarine canyon, northern California. *GSA 2016 Annual Meeting*.
- Hammond, A.P., Carroll, A.R., Smith, M.E., Lowenstein, T.K., 2016, Was Colorado Mineral Belt volcanism responsible for sodium-carbonate deposits in the Green River Formation? *GSA 2016 Annual Meeting*.
- Leary, R.J., Umhoefer, P.J., Smith, M.E., Riggs, N.R., 2016, A three-sided orogeny: A new tectonic model for Ancestral Rocky Mountain uplift and basin development. *GSA 2016 Annual Meeting*.
- Chapman, K., Parnell, R., Smith, M.E., Grams, P.E., Mueller, E.R., 2016, Evaluating the effectiveness and long-term sustainability of experimental floods on the Colorado River in the Marble Canyon reach of Grand Canyon, AZ. *GSA 2016 Annual Meeting*.
- Canada, A.S., Cassel, E.J., Stockli, D.F., Smith, M.E., Jicha, B.R., Singer, B.S., 2016, Early Cenozoic extension and accommodation in the Basin and Range: Implications from apatite and zircon double dating. *GSA 2016 Annual Meeting*.
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