

Curriculum Vitae

Michael Elliot Smith

Professional address

School of Earth Sciences and Environmental Sustainability
Northern Arizona University
602 S Humphreys
Flagstaff, AZ 86011

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: Alan R. Carroll and Brad S. Singer - Minor: Geography

Appointments

Assistant Professor, Northern Arizona University, Flagstaff, AZ [2014-present]
Associate Professor, 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

Search Chair, Natural Disasters Lecturer, Northern Arizona University (current)
Geology Graduate Committee, Northern Arizona University [2015-2017]
Chair, Sonoma State University General Education Subcommittee [2010-2014]
International Limnogeology Congress [2015-present]
Field trip leader: International Limnogeology Congress [Summer 2015]

Teaching

Northern Arizona University: 4 courses per year, including Sedimentology and Stratigraphy, Depositional Systems, Sedimentary Petrology, Basin Analysis, and both junior and senior-level Field Mapping courses.

Sonoma State University: 6 courses per year, including Sedimentary Geology, Field Mapping courses, Geology of Climate Change, Geologic Appl. of GIS, Introductory Geology, Disasters.

University of Montana: 4 courses per year, including Mineralogy-Petrology, Geomorphology, Geologic Appl. of GIS.

Carleton College: Sedimentary Geology.

Research Students

Northern Arizona University: (graduate students) Sam Werner, Rachel Krueger, Elizabeth Johnson, Katie Chapman, Greg Burr; (undergraduate students) Carolyn Box, Kai Smith-Crain, Kiley Sheehan.

Sonoma State University: (undergraduate students) Jason Hoefler, Sam Werner, Rebekah Cesmat, Tracy Riedel, Devon Jorgenson, Carley Dunleavy, Russel DiFiori, Chris Davidson, Chase Glenister, Natalia Chavez, Andrew Canada, Emily White, Erin Hoxsie.

Publications

2017

Lowenstein, T.K., Jagniecki, E.A., Carroll, A.R., Smith, M.E., Renaut, R.W., Owen, R.B. (in review)
The Green River salt mystery: What was the source of the hyperalkaline lake waters? *Earth Science Reviews*.

- Smith, M.E., Finnegan, N.J., Mueller, E.R., and Best, R.J. (in review) Terrestrial bedrock controls submarine canyons: *Nature*.
- Smith, M.E., Cassel, E.J., Jicha, B.J., Singer, B.S., Canada, A. (in review) Hinterland drainage closure and lake formation in response to middle Eocene Farallon slab removal, Nevada, U.S.A., *Earth and Planetary Science Letters*.
- Leary, R., Umhoefer, P.J., Smith, M.E., Riggs, N.R. (in revision) A three-sided orogen: a new tectonic model for Ancestral Rocky Mountain uplift and basin development, *Geology*.

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.

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.

Grant Funding

Collaborative Research: Generating High Topography in Continental Interiors - The Record of Flat Slab Subduction and Uplift in the Rocky Mountains and High Plains. Pending, NSF Earthscope [3 years, \$233,448, *lead PI*].

Collaborative Research: Crossing the Land-Sea Divide - Quantifying the Role of Terrestrial and Nearshore Bedload Flux in Submarine Canyon Evolution. Pending, NSF Marine Geology and Geophysics. [3 years, \$990,841, *lead PI*].

Collaborative Research: Green River Eocene Earth and Climate Observatory (GREECO). Pending, NSF Integrated Earth Systems [5 years, \$275,405, *PI*].

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

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

Quantifying the temporal evolution of Eocene Lake Gosiute. [2003-2006, \$268,003, *primary proposal author & PhD student researcher*].

Northern Arizona Faculty Grants Program Recipient [2015]; GSA Research Grant [2002]; AAPG Research Grant [2001]; GSA Research Grant [2000]; Sigma Xi Research Grant [2000]

Honors & Awards

Sonoma State University Summer Research Fellowship [2011, 2013]
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

Loma Linda University, 2016; International Limnogeology Congress, 2015; University of Idaho, 2015; Oregon State University, 2014; Northern Arizona University, 2014; University of California, Santa Cruz, 2013; Stanford University, 2009; Sonoma State University, 2006; Chico State University, 2006

Conference Abstracts student authors underlined

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

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 Abstract*.

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 Abstract*.

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 Abstract*.

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 Abstract*.

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 Abstract*.

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 Abstract*.

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 Abstract*.

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 Abstract*.

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 Abstract*.

Carroll, A.R., Smith, M.E., 2016, Lake deposits as archives of continental-scale landscape evolution: Examples from the Eocene Green River Formation. *GSA 2016 Annual Meeting Abstract*.

Chapman, K., Parnell, R., Smith, M., Grams, P., Mueller, 2015, Use of Composite Fingerprinting Technique to Determine Contribution of Paria River Sediments to Dam-Release Flood Deposits in Marble Canyon, Grand Canyon, AZ. *AGU 2015 Annual Meeting Abstract*.

Cassel, E.J., Smith, M.E., Canada, A.C., Stockli, D., Brecker, D., 2015, The Paleogene Evolution of the Cordilleran Hinterland. *AGU 2015 Annual Meeting Abstract*.

- Canada, A.C., Cassel, E.J., Smith, M.E., Stockli, D., Jicha, B.J., Singer, B.S., 2015, Insights into the Tectonic Evolution of the North American Cordilleran Hinterland from Detrital Zircon Double Dating of the Eocene Elko Formation. *AGU 2015 Annual Meeting Abstract*.
- Smith, M.E., Cassel, E.J., Canada, A.C., Jicha, B.J., Singer, B.S., 2015, A Major Eocene Lake System in the Hinterland of the North American Cordillera Comes into Geochronologic Focus. *AGU 2015 Annual Meeting Abstract*.
- Smith, M.E., Cassel, E.J., Jicha, B.J., Singer, B.S., Carroll, A.R., 2014, Eocene lake basins in Wyoming and Nevada record rollback of the Farallon flat-slab beneath North America. *AGU 2014 Annual Meeting Abstract*.
- Jorgenson, D., Dunleavy, C., Smith, M.E., 2014, Morphology and Sediment Transport Dynamics of a Trough-Blowout Dune, Bodega Marine Reserve, Northern California. *AGU 2014 Annual Meeting Abstract*.
- Smith, M.E., Carroll, A.R., Jicha, B.J., Cassel, E.J., Scott, J.J., Paleogeographic record of Eocene Farallon slab rollback beneath North America. *GSA 2014 Annual Meeting Abstract*.
- Scott, J.J., Dutchak, A.R., Plante, K.E., Maybury, B.R.P., Smith, M. E., 2014, “Algal heads” and travertine on the southern lake margin of the Eocene Green River Formation, Wyoming and Colorado. *GSA 2014 Annual Meeting Abstract*.
- Cassel, E.J., Brecker, D.O., Smith, M.E., Henry, C.D., 2014, Quantifying paleoelevations using hydrated volcanic glass. *GSA 2014 Annual Meeting Abstract*.
- Maybury, B.R.P., Scott, J.J., Plante, K.E., Smith, M. E., 2014, Tuffaceous microbial mat marker bed, Green River Formation, Wildhorse Draw, Wyoming, constrains timing of silicification in spring mound horizon to ~50 Ma. *GSA 2014 Annual Meeting Abstract*.
- Plante, K.E., Scott, J.J., Maybury, B.R.P., Smith, M. E., 2014, Syndepositional doming and development of a large hydrothermal spring deposit in the Green River Formation, Wildhorse Draw, Wyoming. *GSA 2014 Annual Meeting Abstract*.
- Smith, M.E., Carroll, A.R., Scott, J.J., 2013, Eccentricity-driven carbonate-siliciclastic alternation within the Early Eocene Wilkins Peak Member of the Green River Formation in Wyoming. *GSA 2013 Annual Meeting Abstract*.
- Mueller, E.R., Smith, M.E., Pitlick, J., 2012, Using stream sediment lithology to explore the roles of abrasion and channel network structure in shaping downstream sediment yields, *AGU 2013 Annual Meeting Abstract*.
- Cesmat, R., Werner, S., Smith, M.E., Riedel, T., Best, R., Olyarnik, S., 2012, Quantifying the effects of European beach grass on aeolian sand transport over the last century: Bodega Marine Reserve, California, *AGU 2012 Annual Meeting Abstract*.
- Smith, M.E., Singer, B.S., and Simo, T., 2011, Tiered interpolation of radioisotopic and biostratigraphic geochronology resolves the tempo of the Ordovician greenhouse to icehouse transition. *GSA 2011 Annual Meeting Abstract*.
- Davidson, C., DiFiori, R., Smith, M.E., Mueller, E.R., 2011, From Kings Peak to the Delgado submarine canyon: Tracking littoral inputs to the deep sea at the Mendocino Triple Junction, California. *AGU 2011 Annual Meeting Abstract*.
- Smith, M.E., Carroll, A.R., 2011, Resolving tectonic, climatic, and geomorphologic signatures in the Eocene Green River Formation, Western U.S. *AGU 2011 Annual Meeting Abstract*.
- Smith, M.E., Scott, J.J., and Carroll, A.R., 2009, Weathering, springs, and the origin of Na-evaporites in the Early Eocene Green River Formation: *GSA 2009 Annual Meeting Abstract*.
- Smith, M.E., Chamberlain, K., Singer, B.S., and Carroll, A.R., 2009, Coeval $^{40}\text{Ar}/^{39}\text{Ar}$, U-Pb, and astronomical clocks in the Early Eocene: *GSA 2009 Annual Meeting Abstract*.
- Hoefler, J., Smith, M.E., and Mueller, E.R., 2009, Tracking the downstream fate of diverse lithologies in modern fluvial systems, Northern Rocky Mountains, Idaho: *GSA 2009 Annual Meeting*.
- Mueller, E.R., Pitlick, J., and Smith, M.E., 2008, Lithologic and hydraulic controls on network-scale variations in sediment yield: Big Wood and North Fork Big Lost Rivers, Idaho, *AGU Annual Meeting*.

- Smith, M.E., Carroll, A.R., 2007, High denudation rates in the Eocene Rocky Mountains: A record from evaporites and alluvium in the Green River Formation of Wyoming, International Limnogeology Congress Meeting, Barcelona, Spain, July 11th-14th.
- Smith, M.E., Carroll, A.R., 2007, Temporal Evolution of Eocene Paleohydrology in the Laramide Foreland, Western U. S., International Limnogeology Congress, Barcelona, July 11-14.
- Smith, M.E., Carroll, A.R., 2007, Complex High-Resolution Lacustrine Record of Laramide Tectonism: Green River Formation, Wyoming, AAPG Annual Meeting, Long Beach, CA.
- Smith, M.E., Carroll, A.R., Singer, B.S., 2006 High weathering rates and episodic regional deformation in the Eocene Rocky Mountains: A record from evaporites in the Green River Formation of Wyoming, AGU Annual Meeting.
- Smith, M.E., Carroll, A.R., 2005, Fine-scale stratigraphic and temporal calibration of orogenic strata adjacent to the Uinta Uplift using the Wilkins Peak Member of the Green River Formation, *Geological Society of America Abstracts with Programs*, v. 38, No. 5.
- Smith, M.E., Singer, B.S., and Carroll, A.R., 2005, On the $^{40}\text{Ar}/^{39}\text{Ar}$ age of biotite in Green River Formation ash: The advantages of incrementally heating single crystals with a laser: Goldschmidt 2005 Conference in Moscow, ID.
- Carroll, A.R., Graham, S.A., and Smith, M.E., 2005, Aridity and the evolution of closed basins in Asia: *Geological Society of America Abstracts with Programs*, v. 37, No. 5.
- Smith, M.E., Carroll, A.R., Singer, B.S., 2004, 8 m.y. of Eocene Lake Strata Surrounding the Uinta Uplift: $^{40}\text{Ar}/^{39}\text{Ar}$ Temporal Constraints on Uplift, Subsidence, and Paleohydrology in the Laramide Foreland [abs.]: *Eos. Trans. AGU*, 85(47) Fall Meet. Suppl., Abstract T51D-07.
- Carroll, A.R., Graham, S.A., and Smith, M.E., 2004, Walled Sedimentary Basins of China: Perpetrators or Victims of Plateau Growth? [abs.]: *Eos. Trans. AGU*, 85(47) Fall Meet. Suppl., Abstract T31B-1303.
- Smith, M.E., Secord, R., Wilf, P., Gingerich, P.D., and Singer, B.S., 2004, New radioisotopic age control on late Paleocene continental strata: implications for the age of Chron 26N: *Geological Society of America Abstracts with Programs*, v. 36, Paper No. 192-8.
- Smith, M.E., Carroll, A.R., Singer, B., 2003, Correlation of Lacustrine Strata across the Uinta Uplift using $^{40}\text{Ar}/^{39}\text{Ar}$ Geochronology [abs.]: Third International Limogeology Congress (ILIC3), Tuscon, Arizona, March 29 - April 2.
- Pietras, J.T., Smith, M.E., Carroll, A.R., Singer, B.S., 2002, Direct measurement of depositional cyclicity using $^{40}\text{Ar}/^{39}\text{Ar}$ dating; a 430 thousand year record from Eocene Lake Gosiute: *Geological Society of America Abstracts with Programs*, v. 34, no. 6, p. 479.
- Carroll, A.R., Smith, M.E., Pietras, J.T., Rhodes, M.K., Singer, B.S., 2002, Accumulation rates in ancient lakes; relationship to lake type evolution of the Green River Formation, Wyoming: *Geological Society of America Abstracts with Programs*, v. 34, no. 6, p. 479.
- Bohacs, K.M., Carroll, A.R., Pietras, J.T., Rhodes, M.K., Smith, M.E., 2002, Evolution of the Great Lakes system of the Green River Formation; tectonically & topographically conditioned records of climate change, *Geological Society of America Abstracts with Programs*, v. 34, no. 6, p 478-479.
- Carroll, A.R., Smith, M.E., Singer, B.S., Pietras, J.T., 2001, Laser Fusion $^{40}\text{Ar}/^{39}\text{Ar}$ geochronology and cyclostratigraphy of the Green River Formation: Testing micro- and meso- scale climate forcing [abs.]: *Eos. Trans. AGU*, 82(47), Fall Meet. Suppl., Abstract T21D-08.
- Smith, M.E., Singer, B.S., Carroll, A.R., 2001, Precise $^{40}\text{Ar}/^{39}\text{Ar}$ laser fusion geochronology of the Green River Formation, Wyoming: *Geological Society of America Abstracts with Programs*, v. 33, no. 6, p. 79.
- Carroll, A.R., Smith, M.E., Singer, B.S., Pietras, J.T., 2000, Deposition, alteration and crystallinity of Eocene tuffs of the Green River Formation, Wyoming and Utah: *Geological Society of America Abstracts with Programs*, v. 32, no. 7, p. 459.