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AREAS OF SPECIALIZATION

Structural geology, tectonics, petrology, geochronology

EDUCATION

2009 – Ph.D. University of Minnesota, August 2009
2004 – M.S. University of Wyoming, May 2004
2001 – B.S. Geology/Biology, University of Rochester, 2001

PROFESSIONAL EXPERIENCE

Adjunct Assistant Professor–University of Minnesota, 2016
Adjunct Assistant Professor–University of St Thomas, 2016
Assistant Professor–Salem State University, 2010–2016
Post-doctoral Fellow–Smithsonian Tropical Research Institute, 2009–2010
Panamá Geology Project-Panama Canal zone and Eastern Panama

RECENT PUBLICATIONS

Articles in Peer-Reviewed Journals

- McFadden, R.R.**, Teyssier, C., Siddoway, C.S., Cosca, M.A., and Fanning, C.M., 2015, Mid-Cretaceous oblique rifting of West Antarctica: Emplacement and rapid cooling of the Fosdick Mountains migmatite-cored gneiss dome: *Lithos*, 232, 306–218.
- McFadden, R.R.**, Mulch, A., Teyssier, C., and Heizler, M., 2015, Eocene extension and meteoric fluid flow in the Wildhorse Detachment, Pioneer metamorphic core complex, Idaho: *Lithosphere*, doi: 10.1130/L429.1.
- Saito, S., M. Brown, F. J. Korhonen, **R. R. McFadden**, and C. S. Siddoway, 2013, Petrogenesis of Cretaceous mafic intrusive rocks, Fosdick Mountains, West Antarctica: Melting of the sub-continental arc mantle along the Gondwana margin, *Gondwana Research*, 23, 1567–1580.
- Yakymchuk, C., C. S. Siddoway, C. M. Fanning, **R. R. McFadden**, F. J. Korhonen, and M. Brown, 2013, Anatectic reworking and differentiation of continental crust along the active margin of Gondwana: a zircon Hf-O perspective from West Antarctica, *Geol. Soc. London Spec. Publ.*
- Montes, C., Cardona, A., **McFadden, R.**, Moron, S.E., Silva, C.A., Restrepo-Moreno, S., Ramirez, D.A., Hoyos, N., Wilson, J., Farris, D., Bayona, G.A., Jaramillo, C.A., Valencia, V., Bryan, J., and Flores, J.A., 2012, Evidence for middle Eocene and younger land emergence in central

- Panama: Implications for Isthmus closure, Geological Society of America Bulletin, doi: 10.1130/B30528.
- Whattam, S.A., Montes, C., **McFadden, R.R.**, Cardona, A., Ramirez, D., and Valencia, V., 2012, Age and origin of earliest adakitic-like magmatism in Panama: Implications for the tectonic evolution of the Panamanian magmatic arc system, *Lithos*, 142–143, 226–244.
- McFadden, R.R.**, Siddoway, C.S., Teyssier, C., and Fanning, C.M., 2010, Cretaceous oblique extensional deformation and magma accumulation in the Fosdick Mountains migmatite-cored gneiss dome, West Antarctica: *Tectonics*, doi: 10.1029/2009TC002492.
- McFadden, R.R.**, Teyssier, C., Siddoway, C.S., Whitney, D.L., and Fanning, C.M., 2010, Oblique dilation, melt transfer, and gneiss dome emplacement: *Geology*, 375–378, doi: 10.1130/G30493.1.
- McFadden, R.**, Siddoway, C.S., Teyssier, C., Fanning, C.M., and Kruckenberg, S.C., 2007, Cretaceous oblique detachment tectonics in the Fosdick Mountains, Marie Byrd Land, Antarctica, in *Antarctica: A Keystone in a changing World – Online Proceedings of the 10th ISAES*, edited by A.K. Cooper and C.R. Raymond et al., USGS Open-File Report 2007-1047, Short Research Paper 046, 6 p.; doi: 10.3133/of2007-1047.srp046.
- McFadden, R.R.**, Snoke, A.W., and Barnes, C.G., 2006, Structural and Petrologic evolution of the Bear Peak intrusive complex, Klamath Mountains, California, in Snoke, A.W., and Barnes, C.G., eds., *Geologic studies in the Klamath Mountains province, California and Oregon*. GSA Special Paper 410, p. 333–355, doi: 10.1130/2006.2410(16).
- Barnes, C.G., Snoke, A.W., Harper, G.D., Frost, C.D., **McFadden, R.R.**, Bushey, J.C., Barnes, M.W., 2006, Arc plutonism following regional thrusting: Petrology and geochemistry of syn- and post-Nevadan plutons in the Siskiyou Mountains, Klamath Mountains province, California, in Snoke, A.W., and Barnes, C.G., eds., *Geologic studies in the Klamath Mountains province, California and Oregon*, GSA Special Paper 410, p. 357–376, doi: 10.1130/2006.2410 (17).

*Maps and Technical Reports (*undergraduate author)*

- *Rice, A.K., Sutcliffe, R., and **McFadden, R.R.**, 2014, Preliminary 1:24000 scale geologic map of the southern half of the Grantham 7.5-minute quadrangle in New Hampshire, EdMap program.
- McFadden, R.R.**, Rice, A.K., and Sutcliffe, R., 2014, Detailed Bedrock Mapping in the Grantham 7.5-minute quadrangle, Bronson Hill Anticlinorium and New England Plutonic Suite, New Hampshire, Technical Report.

Abstracts

- *Killam, S.L., and **McFadden, R.R.**, 2015, Emplacement of the Croydon Dome in southwestern New Hampshire using microstructures from the northern dome margin, *NE GSA Abstracts with Programs*, 47, 90.
- McFadden, R.R.**, Rice, A.K., Sutcliffe, R., Killam, S.L., and Larkin, E.A., 2015, Neocadian extrusion of the Croydon Dome within the Bronson Hill Anticlinorium in southwestern New Hampshire, *NE GSA Abstracts with Programs*, 47, 120.
- McFadden, R.R.**, Larkin, E., Rice, A.K., Sutcliffe, R., and Jercinovic, M.J., 2014, Neo-acadian deformation in the New England Appalachians documented by northward extrusion of the Croydon Dome in southwestern New Hampshire, *GSA Abstracts with Programs*, 46, 24.

- *Sutcliffe, R., Rice, A.K., **McFadden, R.R.**, 2014, Brittle structures and the Grantham Fault within the southern half of the 7.5-minute Grantham Quadrangle, New Hampshire, NE GSA Abstracts with Programs
- *Rice, A.K., Sutcliffe, R., and **McFadden, R.R.**, 2014, EDMAP bedrock geologic map of the southern half of the 7.5-minute Grantham Quadrangle, Sullivan County, NH, NE GSA Abstracts with Programs.
- McFadden, R.R.**, 2013, Dates, rates, and fates: bringing the deep, hot crust of West Antarctica towards the surface of the Earth, Sigma Xi Research Conference.
- *Larkin, E., **McFadden, R.R.**, and Valley, P., 2013, Deformation history and emplacement of the Croydon gneiss dome, southwestern New Hampshire, NE GSA, abstracts with Programs.
- *Larkin, E., and **McFadden, R.R.**, 2013, Metamorphism and deformation within the Croydon dome, southwestern New Hampshire, Sigma Xi Research Conference
- *Grant, C.R., **McFadden, R.R.**, and Hanson, L.S., 2013, Geologic mapping of the Lynn Woods Reservation, MA, Sigma Xi Research Conference.
- Siddoway, C., Yakymchuk, C., Fanning, C.M., Brown, M., **McFadden, R.**, and Korhonen, F., 2012, O and Hf isotope signature of zircon in anatectic granites emplaced during Cretaceous transtension, West Antarctica, 34th International Geological Congress, Brisbane, Australia.
- *DiFrancesco, B., and **McFadden, R.R.**, 2012, Microstructural study of the mantling units of the Pelham gneiss dome, central Massachusetts, Abstracts with Programs, GSA, 44, 100.
- *DiFrancesco, B., and **McFadden, R.R.**, 2012, Microstructural Analysis of the Clough Quartzite along a transect of the Pelham Dome, central Massachusetts, Sigma Xi North Shore Chapter Research Symposium.
- *Whittemore, K., and **McFadden, R.R.**, 2012, A petrographic analysis of Castle Rock, Marblehead, Massachusetts, Sigma Xi North Shore Chapter Research Symposium.
- McFadden, R.R.**, Teyssier, C., Siddoway, C.S., and Cosca, M.A., 2011, Rotation of the strain field during emplacement and exhumation of the Fosdick Mountains migmatite-cored gneiss dome, West Antarctica, Abstracts with Programs, GSA, 202-4.
- Siddoway, C., Fanning, C.M., **McFadden, R.**, Yakymchuk, C., Saito, S., Korhonen, F., and Brown, M., 2011, U-Pb, O, and Hf isotope investigation of sources for anatectic granites emplaced during Cretaceous wrench versus transtension in the Fosdick gneiss dome, Marie Byrd Land, ISAES 11, Edinburgh 2011,
- McFadden, R.R.**, Mulch, A., Teyssier, C., Seaton, N.C., and *Tokle, L., 2010, The relationship between microstructure and hydrogen isotopes in the Wildhorse detachment, Pioneer Mountains, Idaho, American Geophysical Union, Fall Meeting, 2010, T41B-2152
- Malekpour, A., **McFadden, R.R.**, Teyssier, C., Seaton, N., *Tokle, L., 2010, Microstructure and kinematic vorticity of Kinnikinnick quartzite, Pioneer metamorphic core complex, Idaho, Geological Society of America, Abstracts with Programs, 42, 5, p. 263.
- McFadden, R.R.**, Teyssier, C., Siddoway, C.S., Whitney, D.W., and Fanning, C.M., 2009, Melt transfer and gneiss dome emplacement during oblique dilation, GSA Abstracts with Programs, v. 41, n. 7, p. 60.
- Siddoway, C.S., Fanning, C.M., and **McFadden, R.R.**, 2009, The record of East Gondwana margin cycles in West Antarctica: Evidence from Marie Byrd Land, GSA Abstracts with Programs, v. 41, n. 7, p. 224.
- McFadden, R.**, Teyssier, C., Siddoway, C.S., and Cosca, M., 2008, Evidence from the Fosdick Mountains, Antarctica for Rapid Cooling of Mid- to Lower Crustal Rocks during Cretaceous

- Intracontinental Extension of the East Gondwana Margin, GSA Abstracts with Programs, 322-11.
- Siddoway, C.S., **McFadden, R.**, Teyssier, C., Fanning, C.M., and Vail, R., 2008, Characterization of melt-transfer to accumulation in a transcurrent zone using U-Pb SHRIMP geochronology, meso- and microstructures of granites, Fosdick Mountains, Antarctica, GACMAC, Ab. No. 413.
- McFadden, R.**, Teyssier, C. Siddoway, C.S., and Fanning, C.M., 2008, Structural and rheological controls of km-scale melt transport and accumulation in a migmatite complex: Fosdick Mountains, West Antarctica, GACMAC, Ab. No. 414.
- Siddoway, C.S., **McFadden, R.**, Saito, S., Fanning, C.M., Korhonen, F., Teyssier, C., and Brown, M., 2008, Consequences of 'hot orogenesis' for Cretaceous breakup of East Gondwana's active margin: Perspectives from West Antarctica, EGU3008-A-08573: TS12-1TU5O-003.
- McFadden, R.**, Siddoway, C.S., Teyssier, C., Fanning, C.M., and Kruckenberg, S.C., 2007, Cretaceous oblique detachment tectonics in the Fosdick Mountains, Marie Byrd Land, Antarctica, in Antarctica: A Keystone in a changing World – Online Proceedings of the 10th ISAES, Santa Barbara, California.
- McFadden, R.**, Teyssier, C. Siddoway, C.S., and Fanning, C.M., 2007, Duration of melt-present to solid-state deformation in the South Fosdick detachment zone, Fosdick Mountains, West Antarctica, GSA Abstracts with Programs, v. 39, n. 6, p. 229.
- McFadden, R.**, Siddoway, C.S., Teyssier, C., and Fanning, C.M. 2007, Melt migration in a melt-present shear zone: Fosdick Mountains, Marie Byrd Land, Antarctica, GSA Penrose Conference, Naxos, Greece.
- Siddoway, C.S., **McFadden, R.**, Teyssier, C. Kruckenberg, S.C., and Haywood, J.C., 2006, Structural controls on melt transport paths and duration of deformation-induced melt migration, Fosdick Mountains, Antarctica, GSA Abstracts with Programs, v. 38, n. 7, p. 342.
- Vogl, J.J., **McFadden, R.**, Grudem, E., 2006, Mid-crustal strain during episodic extension in south-central Idaho: results of preliminary work in the footwall of the Pioneer core complex, GSA Abstracts with Programs, v. 38, n. 7, p. 417.
- McFadden, R.R.**, Barnes, C.G., and Snoke, A.W., 2004, Petrogenesis of a compositionally extended, oceanic-arc plutonic suite: Bear Peak intrusive complex, Klamath Mountains, California: GSA, Abstracts with Programs, v. 36, n. 5, p. 222.
- McFadden, R.R.**, Snoke, A.W., and Barnes, C.G., 2004, Bear Peak intrusive complex, Klamath Mountains, California: evolution of an ultramafic to silicic plutonic suite through crystal accumulation, wall-rock assimilation, and multiple magmas: Geological Society of America, Abstracts with Programs, Vol. 36, No. 4, p. 71.

Field Guides

- Hanson, L.S., and **McFadden, R.R.**, 2014, Rocks and landforms of the Lynn Woods and Breakheart Reservations: What they reveal about the local geologic history and what still needs to be explored, New England Intercollegiate Geologic Conference, Wellesley, MA, C2.
- Hanson, L.S., and **McFadden, R.R.**, 2013, Borestone Mountain: A holistic view of a central Maine Mountain, New England Intercollegiate Geologic Conference, Millinocket, ME, C5-12.
- Hanson, L.S., and **McFadden, R.R.**, 2013, Rocks of the Lynn Woods Reservation and Marblehead Neck, American Engineering Geologists Field Trip.
- McFadden, R.R.**, 2006, A field trip guide to the Bear Peak intrusive complex, Siskiyou County, Klamath Mountains, California.

AWARDS AND GRANTS

External Grants Since Salem State

EdMap grant, National Cooperative Geologic Mapping Program, USGS, 2015

EdMap grant, National Cooperative Geologic Mapping Program, USGS, 2013

Internal Grants Since Salem State

Mini-grant, Salem State University Research Advisory Committee, 2014

Seed Grant, Salem State University Research Advisory Committee, 2012

Council on Teaching and Learning summer grant, Salem State University, 2011

Mini-Grant, Salem State University Research Advisory Committee, 2010

Awards and Grants Prior to Salem State

NSF partial travel grant, SCAR/IASC 2008 IPY, 2008

GSA research grant, 2008, Using hafnium and oxygen isotopes to document melt migration in a shear zone: Fosdick Mountains, West Antarctica

Bruce L. “Biff” Reed Scholarship, GSA, 2008

Penrose travel grant, GSA-NSF 2007

Richard C. Dennis graduate fellowship, University of Minnesota, 2005–2006

Summer research grant, University of Minnesota, 2005, 2006, 2007

Research grant, University of Wyoming, 2004

Gregg Ranch Foundation summer research grant, 2003

Rush Rhees Scholarship, University of Rochester, 1997–2001

UNDERGRADUATE SENIOR THESES

Past theses

2015 – Ashley Lopes, *Kinematic Analysis of the Salem Gabbro within the Burlington Mylonite Zone, Eastern Massachusetts*

2015 – Shaunte Killam, *Micostructural Investigation of the Northern Margin of the Croydon Gneiss Dome, South-Central New Hampshire*

2015 – Craig LoPiccolo, *Geologic Mapping and Emplacement History of the Salem Highland Pluton, Salem, Massachusetts*

2014 – Aaron K. Rice, *Bedrock Geology of the Southern Portion of the 7.5-Minute Grantham Quadrangle, Sullivan County, NH*

2014 – Taigh McDonagh, *Petrographic and Structural Analysis of Rocks From the Mascoma Dome to Clarify the Timing and Mechanism of its Emplacement*

2014 – Ryan Sutcliffe, *Brittle Structures and the Grantham Fault within the southern half of the 7.5-minute Grantham Quadrangle, New Hampshire*

2014 – Jessica Cabral, *Petrographic Analysis of Lynn Woods Plutonic Rocks*

2014 – Stillwin Den, *Origin and Correlation of Alkali Granites on the North Shore, Massachusetts*

2013 – Emma Larkin, *Bedrock Mapping in the Grantham 7.5-Minute Quadrangle: Evidence for Late Acadian Shear Zone Formation*

- 2013 – Shaina Cohen, *A Microstructural and Petrologic Investigation of the Borestone Mountain Contact Aureole*
- 2013 – Cory Grant, *Geologic Mapping of Precambrian Volcanic and Plutonic Rocks Within the Avalon Terrane, Lynn Woods, Eastern Massachusetts*
- 2012 – Kristine Whittemore, *A Petrographic Analysis of Castle Rock, Marblehead Neck, Massachusetts*
- 2012 – Ben DiFrancesco, *Microstructural Analysis of the Clough Quartzite Along a Transect of the Pelham Gneiss Dome, Central Massachusetts*
- 2011 – Amanda Frigon, *Microstructural Analysis of Deformed Migmatites in the Fosdick Gneiss Dome, Marie Byrd Land, West Antarctica*

INVITED LECTURES

Colby College, Department of Geology Seminar Series

Fall 2012, “Oblique tectonics in West Antarctica: A window into the deep crust”

Sigma Xi Induction Ceremony North Shore Chapter Keynote Speaker

Spring 2011, “Fluid flow and deformation within a fault zone along the Pioneer Mountains metamorphic core complex”

Boston College, Department of Earth and Environmental Sciences Seminar series

Fall 2010, “Magma accumulation during oblique extensional deformation in the Fosdick Mountains gneiss dome, West Antarctica”

Carleton College, Geology Department Friday Seminar

Spring 2009, Detachment tectonics in the Fosdick Mountains, West Antarctica

RESEARCH EXPERIENCE

Bronson Hill region, central Massachusetts and New Hampshire, 2011–2015

Field mapping of strongly deformed mid-crustal rocks.

Panama Canal and Eastern Panama Geology Project, 2009

Field mapping of magmatic arc complex consisting of intrusive and extrusive rocks, and sedimentary basin sequences.

Fosdick Mountains migmatite dome, West Antarctica, 2005–2008

Structural field mapping of high temperature deformation in mid-to lower crustal rocks. Sampling for U-Pb and Ar/Ar geochronology, and microstructural analysis, in an effort to understand the timescale of melting, deformation, and exhumation in regions experiencing continental extension.

Pioneer core complex, south-central Idaho, 2004–2007

Structural field mapping of high temperature deformation in mid-crustal rocks.

Bear Peak pluton, Klamath Mountains, CA, 2002–2004

Structural field mapping, sample collection, structural analysis, whole-rock geochemistry to understand pluton emplacement history and petrogenesis

PROFESSIONAL SOCIETIES

Geological Society of America

Sigma Xi

PROFESSIONAL DEVELOPMENT

Transforming STEM Education, AAC&U, three-day conference on best practices and major issues in undergraduate STEM education

Teaching Structural Geology, Geophysics, and Tectonics in the 21st century, On the Cutting Edge, 2012: Four-day workshop addressing teaching, research, and career management; competitive application

Teaching Mineralogy, Petrology, and Geochemistry, On the Cutting Edge, 2011
Four-day workshop addressing teaching, research, and career management; competitive application

Teaching Mineralogy, Petrology, and Geochemistry in the Field: A case study in Northeastern Minnesota, 2011

Three-day fieldtrip addressing teaching techniques in a field setting

Incorporating laptop activities in the classroom, Center for Teaching Innovation, 2011

Workshop addressing using internet based materials, such as iGoogle, to engage students in active learning strategies

Integrated Solid Earth Sciences (ISES) Summer School in Exhumation processes, 2007

Five-day course discussing current research and recent advances in research techniques; competitive application

PROFESSIONAL SERVICE

Office of the MA State Geologist Advisory Committee Member, 2011–present

Sigma Xi North Shore Chapter, vice president, 2011–present

CV and Resume workshop speaker, 2011–2014, Salem State University Earth Science Association

Volunteer, Science Fair, 2011–present, Hannah Elementary School, Beverly, MA

Proposal Reviewer, 2010, 2012, 2014, National Science Foundation (NSF) Tectonics Division

Journal Peer-Reviewer, 2014, *Lithos*, 2012, *GSA Bulletin*, 2009, *Tectonophysics*

Session Chair GSA 2009 Annual Fall Meeting: Evaluating Channel Flow in Orogens