

Dr. Jeffrey H. Marsh

School of Earth and Environmental Sciences, Queens College

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CURRENT POSITION

2013-present Assistant Professor, Queens College
Structural Geology; Metamorphic Petrology; Geochronology; Continental Tectonics

PRIOR EXPERIENCE and EDUCATION

- 2011-2013 Postdoctoral Research Fellow, Jackson School of Geosciences, University of Texas
Research Emphasis: Metamorphic Petrology; Geochronology; Continental Tectonics
- 2010-2011 Faculty Fellow, Colby College
Courses Taught: Structural Geology; Earth and Environment; Evolution of the Himalayan-Tibetan Orogen
- 2006-2010 Ph.D., University of Maine, Geology
Research Emphasis: Metamorphic Petrology; Geochronology; Structural Geology; Tectonics; Numerical Modeling
Dissertation Title: *Interactions among metamorphism, deformation, and chemical transport processes in high-strain crustal rocks*
Advisers: Scott E. Johnson & Christopher C. Gerbi
- 2003-2005 Staff Geologist, URS Corp., Environmental Engineering and Consulting
Duties: Subsurface geological, geotechnical, and environmental characterization and sampling; Installation and operation of subsurface remediation systems; Geological/geochemical data analysis and reporting; Site management
- 2001-2003 M.S., San Diego State University, Geology
Research Emphasis: Petrology; Geochemistry; Structural Geology
Thesis Title: *Petrological and geochemical evidence for an early to middle Jurassic extensional magmatic arc, southeastern, California*
Adviser: Gary H. Girty
- 1996-2001 B.S., University of California, Santa Barbara, Geology and Physical Geography
Research Emphasis: Structural Geology; Tectonics

TEACHING EXPERIENCE

- 2010-2011 Faculty Fellow, Colby College
Structural Geology, Earth and Environment, Evolution of the Himalayan-Tibetan Orogen
- Organize and present lecture material
 - Organize and instruct laboratory and field-based exercises
 - Academic examination, performance assessment, and support
 - Editorial guidance for scientific writing assignments
- Undergraduate Honors Thesis and Independent Study Projects*
- Rheological properties of folded layers during natural deformation as determined from quantitative geometric analysis of fold shape (E. Hoyt)
 - EBSD analysis of pyroxenes in the Zagami Shergottite: Implications for emplacement mechanism (T. Becker)
 - Structural and petrologic interpretation of a shear zone in Northern Yellowstone National Park (W. Fereday)
- 2007, 2009 Teaching Assistant/Laboratory Instructor, University of Maine
Structural Geology
- Assisted professor in classroom and field activities
 - Coordinated, instructed, and graded weekly laboratory exercises
 - Assisted in the development, implementation, and presentation of term modeling projects
- 2006-2009 Teaching Assistant/Conference Moderator, University of Maine
Dynamic Earth (Intro to Earth Systems Science)
- Moderated 20-person online conferences (writing/discussion portion of course)
 - Assisted with completion of course assignments and exam preparation
- 2006 Teaching Assistant/Laboratory Instructor, University of Maine
Introduction to Geology
- Assisted professor in instructing classroom and field activities
 - Coordinated, instructed, and graded weekly laboratory exercises
- 2003 Teaching Assistant/Laboratory Instructor, San Diego State University
Structural Geology
- Assisted professor in instructing geologic mapping and field methods exercises
- 2001-2002 Teaching Assistant/Laboratory Instructor, San Diego State University
Introduction to Geology
- Assisted professor in instructing classroom and field activities
 - Coordinated, instructed, and graded weekly laboratory exercises

RESEARCH INTERESTS

- *Geodynamics, thermal evolution, and structural architecture of tectonically active regions*
- *Geo/thermochronology applied to investigating tectonic processes*
- *Petrogenetic/chemical relations among metamorphic chronometers (e.g. garnet, rutile, zircon)*
- *Phase-equilibrium modeling of metamorphic rock evolution in orogenic belts*
- *Modeling rates of thermal-metamorphic processes using non-equilibrium petrological relations*
- *Interactions among deformation processes, metamorphic reactions, fluid flow, and rheology*

JOURNAL PUBLICATIONS

Marsh, J.H., Culshaw, N.G., and Stockli, D.F. Timing of eclogite formation and host rock metamorphism within a major lithotectonic boundary zone, western Canadian Grenville Province. *Journal of Metamorphic Geology*. (In prep, 80% complete).

Marsh, J.H., Culshaw, N.G. and Gerbi, C.C. On the timing and conditions of poly-phase metamorphism within the Twelve Mile Bay Shear Zone: Implications for the evolution of a mid-crustal decollement zone and western Grenville tectonics. *International Geology Review*, **55**, 525-547.

Marsh, J.H., Grew, E.S., Gerbi, C.C., Yates, M.G and Culshaw, N.G., 2012. The petrogenesis of the garnet menzerite-(Y) in granulite-facies rocks of the Parry Sound domain, Grenville Province, Ontario. *The Canadian Mineralogist*, **50**, 73-99.

Marsh, J.H., Gerbi, C.C., Culshaw, N.G., Johnson, S.E., Wooden, J.L. and Clark, C., 2012. Using zircon U-Pb ages and trace element chemistry to constrain the timing of metamorphic events, dike emplacement, and shearing in the southern Parry Sound domain, Grenville Province, Canada. *Precambrian Research*, **192**, 142-165.

Culshaw, N.G., Gerbi, C.C., Marsh, J.H. and Plug, L.J., 2011. Heterogeneous amphibolite facies deformation of a granulite facies layered protolith: Matches Island shear system, Parry Sound domain, Grenville Province, Ontario, Canada. *Journal of Structural Geology*, **33**, 875-890.

Marsh, J.H., Culshaw, N.G., Gerbi, C.C., Potter, J., Longstaffe, F. and Johnson, S.E., 2011. Initiation and development of the Twelve Mile Bay Shear Zone: The low viscosity sole of a granulite nappe. *Journal of Metamorphic Geology*, **29**, 167-191.

Grew, E.S., Marsh, J.H., Yates, M.G., Lazic, B., Armbruster, T., Locock, A., Bernhardt, H.J. and Medenbach, O., 2010. Menzerite-(Y), a new garnet species, $\{(Y,REE)\}(Ca,Fe^{2+})_2[(Mg,Fe^{2+})(Fe^{3+},Al)](Si_3)O_{12}$, and two new components in garnet, $\{Y_2Ca\}[Mg_2](Si_3)O_{12}$ and $\{Y_2Ca\}[Fe^{2+}_2](Si_3)O_{12}$. *The Canadian Mineralogist*. **48**, 1171-1193.

Culshaw, N.G., Gerbi, C.C. and Marsh, J.H., 2010. Softening the Lower Crust: Pegmatites and Syn-Transport Formation of a Ductile Sheath Around a Deep Crustal Granulite Nappe, Parry Sound Domain, Grenville Province, Ontario, Canada. *Tectonics*, **29**, TC5013.

Gerbi, C.C, Culshaw, N.G. and Marsh, J.H., 2010. Magnitude of weakening during crustal-scale shear zone development. *Journal of Structural Geology*, **32**, 107-117.

Johnson, S.E., Lenferink, H.J., Marsh, J.H., Price, N.A., Koons, P.O. and West, D.P., Jr., 2009. Kinematic vorticity analysis and evolving strength of mylonitic shear zones: new data and numerical results. *Geology*, **37**, 1075-1078.

Johnson, S.E., Lenferink, H.J., Price, N.A., Marsh, J.H., Koons, P.O. West, D.P., Jr. and Beane, R., 2009. Clast-based kinematic vorticity gauges: the effects of slip at matrix/clast interfaces. *Journal of Structural Geology*, **31**, 1322-1339.

Marsh, J.H., Johnson, S.E., Yates, M.G. and West, D.P., Jr., 2009. Coupling of deformation and reactions during mid-crustal shear zone development: an *in-situ* frictional-viscous transition. *Journal of Metamorphic Geology*, **27**, 531-553.

Johnson, S.E., Marsh, J.H. and Vernon, R.H., 2008. From tonalite to mylonite: coupled mechanical and chemical processes in foliation development and strain localization. *Journal of the Virtual Explorer*, **30**, 11.

SELECTED CONFERENCE ABSTRACTS

Marsh, J.H., 2012. On the metamorphic evolution of eclogitic rocks in the western Canadian Grenville Province. Geological Society of America, Fall Meet.

Marsh, J.H., Grew, E.S. & Gerbi, C.C., 2011. The petrogenesis of the garnet menzerite-(Y), $\{(Y, REE)(Ca, Fe^{2+})_2\}[(Mg, Fe^{2+})(Fe^{3+}, Al)](Si_3)O_{12}$, and its bearing on the Y+HREE budget in felsic granulites from the Grenville Province, Parry Sound, Ontario. GAC-MAC Spring Meet.

Grew, E.S., Marsh, J.H., Yates, M.G., 2010. A new yttrium-rich garnet species, $\{(Y, REE)(Ca, Fe^{2+})_2\}[(Mg, Fe^{2+})(Fe^{3+}, Al)](Si_3)O_{12}$: Implications for the prograde metamorphic path in the Parry Sound domain, Central Gneiss Belt, Grenville Orogenic Province. GeoCanada, GAC-MAC Spring Meet.

Marsh, J.H., Culshaw, N.G. and Gerbi, C.C., 2009. Hydration of a crustal-scale shear zone through fracturing and dike emplacement. *Eos Trans. American Geophysical Union*, Vol. 90, Fall Meet. Suppl.

Grew, E.S., Marsh, J.H., Yates, M.G. and Locock, A., 2009. A new garnet, $\{(Y, REE)(Ca, Fe^{2+})_2\}[(Mg, Fe^{2+})(Fe^{3+}, Al)](Si_3)O_{12}$, and its role in the yttrium and rare-earth element budget in a granulite. *Eos Trans. American Geophysical Union*, Vol. 90, Fall Meet. Suppl.

Grew, E.S., Marsh, J.H., Yates, M.G., Lasic, B., Armbruster, T., Locock, A., Bernhardt, H.J. and Medenbach, O., 2009. A new yttrium garnet species, $\{(Y, REE)(Ca, Fe^{2+})_2\}[(Mg, Fe^{2+})(Fe^{3+}, Al)](Si_3)O_{12}$, and two new components in metamorphic garnet: $\{Y_2Ca\}[Mg_2](Si_3)O_{12}$ and $\{Y_2Ca\}[Fe^{2+}_2](Si_3)O_{12}$. Geological Society of America. *Abstracts with Programs*, Vol. 41, No. 7.

Marsh, J.H., Gerbi, C.C. and Culshaw, N.G., 2009. On the role of fluids in deep crustal shear zones. Geological Society of America. *Abstracts with Programs*, NE Section, Vol. 41, No. 3.

Marsh, J.H., Johnson, S.E., Gerbi, C.C. and Culshaw, N.G., 2008. Shear zone development and rheology in the deep orogenic crust. *Eos Trans. American Geophysical Union*, Vol. 89, Fall Meet. Suppl.

Marsh, J.H., Johnson, S.E., Koons, P.O. and Yates, M.G., 2008. Coupled microprocesses and rheological evolution in a reactive shear zone. Geological Society of America. *Abstracts with Programs*, NE Section, Vol. 40, No. 1.

Marsh, J.H., Gerbi, C.C. and Culshaw, N.G., 2008. Fluid-enhanced weakening of meso-scale shear zones in the interior Parry Sound domain, southwestern Grenville Province, Ontario, Canada. Geological Society of America. *Abstracts with Programs*, NE Section, Vol. 40, No. 1.

Marsh, J.H., Johnson, S.E., Koons, P.O. and Yates, M.G., 2007. Constraints on coupled microprocesses, fluid flow, and rheological evolution in a syn-metamorphic shear zone. *Eos Trans. American Geophysical Union*, Vol. 88, Fall Meet. Suppl.

Marsh, J.H., Johnson, S.E., Koons, P.O. and Yates, M.G., 2007. Textural and petrochemical variability across a sheared pluton margin, northeastern Appalachians, USA. Geological Society of America. *Abstracts with Programs*, NE Section, Vol. 39, No. 1.

Marsh, J.H., Johnson, S.E. and Koons, P.O., 2006. Reaction-enhanced strain and fabric development following pluton emplacement in ductile shear zones. *Eos Trans. American Geophysical Union*, Vol. 87, Fall Meet. Suppl.

GRANTS and FELLOWSHIPS

- 2013 NSF – Petrology and Geochemistry Division (submitted)
Title: *Petro-chronological investigation of high pressure rocks in the western Grenville Province: Quantifying lower crustal dynamics in large, hot collisional orogens*
PI: J. Marsh, Co-PI: D. Stockli
- 2011-present Jackson School of Geosciences (University of Texas) Postdoctoral Research Fellowship
▪ Competitive institutional fellowship awarded to 3 researchers in 2011
- 2008-2010 University of Maine Doctoral Research Fellowship
▪ Competitive intra-University fellowship awarded to ~10 Ph.D. students/year
- 2008 Geological Society of America Graduate Research Grant (\$4,000)
- 2008 American Assoc. of Petroleum Geologists Graduate Research Grant (\$2,000)
- 2006 University of Maine Summer Graduate Research Fellowship (\$4,000)
- 2002 San Diego State University Tom Schar Memorial Scholarship (\$500)

SYNERGISTIC ACTIVITIES

- 2013 Session organizer, SE-GSA sectional meeting: *Delving deeper into petrogenesis: advances in petrology and geochronology with applications to tectonics.*
- 2012 Referee, NSF Petrology and Geochemistry proposal
- 2010 Co-leader, New England International Geological Conference field trip, south, Central Maine, USA
- 2007-1010 Assistant, Junior High School *Geology Day*, University of Maine

ACADEMIC AWARDS

- 2008 GSA Outstanding Graduate Research Grant Proposal
▪ One of 20 recipients, 302 grant awardees, 570 applicants
- 2008 GSA Structural Geology and Tectonics Division Exceptional Merit Award
▪ Selected from graduate research grant proposal
▪ One of 3 awards in Structural Geology and Tectonics Division
- 2008 NEGSA Section Meeting, Second Place Graduate Student Poster Presentation
- 2003 San Diego State University, Best Master's Thesis Presentation
- 2001 University of California, Santa Barbara, Dean's Honors List

WORKSHOPS and SUMMER SCHOOLS

- 2008 Marie Curie Actions, Knowledge-Based Materials (EU-sponsored)
Aqueous and Porous Materials
Trest, Czech Republic
- 2008 Integrated Solid Earth Sciences (NSF-sponsored)
Dates, Rates, and States
Colorado Springs, USA
- 2007 Marie Curie Actions, European Intensive Seminar in Petrology (EU-sponsored)
State-of-the-Art Analytical and Imaging Techniques in Petrology
Paris, France