CALEB W. HOLYOKE, III *cholyoke@uakron.edu*
Department of Geosciences, 185 E. Mill St., Crouse Hall 114, University of Akron, Akron, OH 44325-4101, 330-972-7635

EDUCATION

BROWN UNIVERSITY
Ph.D., Geological Sciences, 2005
Dissertation – Strain Weakening in Crustal and Upper Mantle Lithologies: Processes and Consequences
Advisor: Dr. Jan Tullis

UNIVERSITY OF VERMONT
M.S., Geology, 2000
Thesis – An Experimental Study of Melt Migration Mechanisms in Two Common Crustal Rock Types
Advisor: Dr. Tracy Rushmer

JAMES MADISON UNIVERSITY
B.S., Geology, Environmental Concentration, 1994
Advisor: Dr. Roddy Amenta

FUNDING

Collaborative Research: Magnesite Deformation and Potential Roles in the Slip and Seismicity of Subduction Zones, PI with Dr. Andreas Kronenberg (co-PI, Texas A&M University) and Dr. Paul Raterron (co-PI, Brown University), $195,035 ($386, 930 total), National Science Foundation, 08/2016 – 07/2019.

A reversible rheology for water-weakened quartz, PI with Dr. Andreas Kronenberg (co-PI, Texas A&M University), $420,124, National Science Foundation, 08/2013 – 07/2016, extended to 07/2017.

Rheology of orthopyroxene, PI with Dr. Andreas Kronenberg (co-PI, Texas A&M University), $280,000, National Science Foundation, 01/2011-12/2012, extended to 12/2013.

Experimental and natural deformation of magnesian carbonates, Co-PI with Drs. Julie Newman and Andreas Kronenberg (Texas A & M University), $399,918, National Science Foundation, 07/2009-06/2012, extended to 06/2013.

PROFESSIONAL EXPERIENCE

DEPARTMENT OF GEOSCIENCES, UNIVERSITY OF AKRON
Assistant Professor, August 2014 to date

I built a high pressure rock deformation laboratory, am supervising five graduate students and seven undergraduate senior projects (Four honor's theses, three in 2015-2016, one in 2016-2017). Examples of their projects include investigating the effects of water on the strength of quartz, effects of rubber on asphalt concrete elasticity, effects of bedding on joint propagation in sandstones and the pressure and grain size sensitivity of the strength of magnesite. I also taught general courses such as Physical Geology and Earthquakes: Why, When, How? and upper level courses such as Structural Geology, Field Camp II and a graduate seminar on hydraulic fracturing. I am very involved in undergraduate education and became Director of Undergraduate Studies for the Department of Geosciences in August 2016.

DEPARTMENT OF GEOLOGY AND GEOPHYSICS, TEXAS A & M UNIVERSITY
Associate Research Scientist, September 2013 to August 2014
Assistant Research Scientist, August 2007 to August 2013

I rebuilt the high-pressure rock deformation laboratory at Texas A&M University, trained students and visiting scientists to use the facility and performed several experimental investigations of crustal and mantle mineral aggregates, primarily with Dr. Andreas Kronenberg. These projects include investigating: 1) differences in the hydrolytic weakening mechanism in milky quartz single crystals and quartzites, 2) rheology of orthopyroxene, 3) the rheology of polycrystalline magnesite, 4) dislocation creep and strain localization in polycrystalline dolomite, 4) the reasons for differences between the stress measurements of the Griggs rock deformation apparatus and low confining pressure gas rock deformation apparatus and 5) the effects of water and confining pressure on the rheology and lattice preferred orientations of polycrystalline olivine aggregates at high pressures (4-8 GPa) at the National Synchrotron Light Source at Brookhaven National Laboratory in Upton, NY.

DEPARTMENT OF EARTH AND PLANETARY SCIENCES, UNIVERSITY OF TENNESSEE, KNOXVILLE
Visiting Scholar, August 2006 to July 2007

As a visiting scholar I taught four courses over the year long position; two sections of The Dynamic Earth, one section of Structural Geology and a field-based course on the northern Appalachians. I developed both the lecture and laboratory sections of the structural geology course, the lecture section of the introductory geology course and managed the lab sections taught by teaching assistants.

DEPARTMENT OF GEOLOGY AND GEOPHYSICS, UNIVERSITY OF WISCONSIN-MADISON
Post-doctoral Scholar, August 2005 to July 2006

As a postdoctoral scholar I worked with Dr. Basil Tikoff on a project to measure water contents of olivine using the FTIR in naturally deformed peridotites from the Red Hills in New Zealand. I also developed new techniques for adding water to olivine at high pressure (1.5 GPa) while being able to accurately measure stresses using the molten salt cell in the Griggs rock deformation apparatus.

DEPARTMENT OF GEOLOGY, UNIVERSITY OF RHODE ISLAND
Lecturer, July to August 2005, July to August 2006

I was given the opportunity to teach a summer session course, environmental geology. I designed the course to increase the students' scientific literacy and provide the basis for understanding how humanity is affected by and affects geologic processes.

DEPARTMENT OF GEOLOGICAL SCIENCES, BROWN UNIVERSITY
Research Assistant and Teaching Assistant, September 2000 to May 2005
Advisor: Dr. Jan Tullis

As a research assistant I maintained normal lab function, assisted Dr. Tullis in training undergraduates, post-doctoral scholars and other visitors to use the Griggs rigs. I also learned transmission and scanning electron microscopy, electron backscatter pattern analysis and Fourier transform infrared spectrometry. As a teaching assistant I was responsible for mineralogy and structural geology laboratory sections.

DEPARTMENT OF GEOLOGY, UNIVERSITY OF VERMONT
Teaching Assistant, August 1998 to August 2000
Advisor: Dr. Tracy Rushmer

As a teaching assistant I was responsible for assisting Dr. Rolfe Stanley in teaching Field Geology during fall semesters and teaching the laboratory portion of Plate Tectonics with Dr. Barry Doolan in spring semesters. Responsibilities included organization of lectures, preparation of laboratory exercises, grading of field reports and laboratory exercises, and supervision of one undergraduate assistant. I learned basic operation of the Griggs apparatus and the scanning electron microscope.

MARCOR REMEDIATION, INC

Geologist and Project Manager, November 1994 to August 1998

As a project manager, I was responsible for management of all aspects of environmental contracting projects. These responsibilities included bidding, scheduling, tracking, preparation of technical reports, and management of daily activities for several projects. These projects included operation and maintenance of a leachate collection system and installation of an ultraviolet disinfection system for effluent of a wastewater treatment facility. I used a variety of techniques for environmental site investigation, such as lithologic logging of soil borings, installing groundwater monitoring wells and collecting and analyzing soil, groundwater and air samples.

PEER-REVIEWED PUBLICATIONS

RATTERON, P., FRAYSSE, G., GIRARD, J., **HOLYOKE, C. W.**, 2016, Strength of orthoenstatite single crystals at mantle pressure and temperature and comparison with olivine, Earth and Planetary Science Letters, v. 450, p. 326-336, DOI: 10.1016/j.epsl.2016.06.025

KILIAN, R., HEILBRONNER, R., **HOLYOKE, C. W.,** KRONENBERG, A., STUNITZ, H., 2016, Dislocation creep of dry quartz, v. 121, p. 3278–3299, DOI: 10.1002/2015JB012771.

HOLYOKE, C. W., KRONENBERG, A., NEWMAN, J. AND ULRICH, C., 2014, Rheology of magnesite, *Journal of Geophysical Research*., v. 119, p 6534-6557, doi: 10.1002/2013JB010541.

HOLYOKE, C. W., KRONENBERG, A., NEWMAN, J., 2014, Microstructural evolution during strain localization in dolomite aggregates, *Journal of Structural Geology*. doi: 10.1016/j.jsg.2014.04.008.

HOLYOKE, C. W. AND KRONENBERG, A., 2013, Reversible water weakening of quartz, *Earth and Planetary Science Letters*, v. 347, p. 185-190, doi: 10.1016/j.epsl.2013.05.039.

RATTERON, P., MERKEL, S., **HOLYOKE, C. W.**, 2013, Axial temperature gradient and stress measurements in the deformation-DIA cell using alumina pistons, *Review of Scientific Instruments*, v. 84, 043906; doi: 10.1063/1.4801956

HOLYOKE, C. W., KRONENBERG, A., NEWMAN J., 2013, Dislocation creep of polycrystalline dolomite, *Tectonophysics*, v. 590, p. 72-82.

STEWART, E., **HOLYOKE, C. W.,** KRONENBERG, A., 2013, High pressure deformation experiments using solid confining media and Griggs piston-cylinder methods: appraisal of stress and deformation in talc assemblies, *Tectonophysics*, v. 588, p. 171-178.

GIRARD, J., CHEN, J., RATTERON, P., **HOLYOKE, C. W.**, 2013, The effect of hydroxyls on olivine deforming by dislocation creep: rheology of single crystals oriented for (010)[100] slip, *Physics of the Earth and Planetary Interiors*, v. 216, p. 12-20.

HOLYOKE, C. W. AND KRONENBERG, A., 2010, Accurate differential stress measurement using the molten salt cell and solid salt assemblies in the Griggs apparatus with applications to strength, piezometers and rheology, *Tectonophysics*, v. 494, no. 1-2, p. 17-31.

GIRARD, J., CHEN, J., RATERRON, P., **HOLYOKE, C. W.**, 2010, Deformation of single crystal sample using D-DIA apparatus coupled with synchrotron X-rays: In situ stress and strain measurements at high pressure and temperature, *Journal of Physics and Chemistry of Solids*, v. 71, no 8, p. 1053-1058.

WEBBER, C., **HOLYOKE, C. W.**, NEWMAN, J. LITTLE, T., TIKOFF, B., 2010, Fabric development in cm-scale shear zones, Red Hills, New Zealand, *Tectonophysics*, v. 489, no. 1-4, p. 55-75.

HOLYOKE, C. W. AND TULLIS J., 2006, The interaction between reaction and deformation: an experimental study using a biotite + plagioclase + quartz gneiss, *Journal of Metamorphic Geology*, v. 24, no. 8, p. 743 - 762.

HOLYOKE, C. W. AND TULLIS J., 2006, Mechanisms of weak phase interconnection and the effects of phase strength contrast, *Journal of Structural Geology*, v. 28, no. 4, p. 621-640.

HOLYOKE, C. W. AND TULLIS J., 2006, Formation and maintenance of shear zones, *Geology*, v. 34, no. 2, p 105-108.

HOLYOKE, C. W. AND RUSHMER, T., 2002, An experimental study of grain scale melt segregation mechanisms in two common crustal rock types, *Journal of Metamorphic Geology*, v. 20, no. 5, p. 493-512.

PUBLICATIONS IN REVIEW/PREPARATION

HOLYOKE, C. W., GIRARD, J., RATTERON, P., *In review*, Hydrolytic weakening of olivine at upper mantle pressures: Pressure dependence of the rheology of hydrated dunites deformed by dislocation creep, *Tectonophysics*.

SELECTED INVITED PRESENTATIONS

Magnesite Deformation and Potential Roles in the Slip and Seismicity of Subduction Zones, Northern Ohio Geological Society, *February 2016*.
Deformation of wet olivine aggregates at high confining pressures, Kent State University, *March 2015.*
Interaction between deformation and metamorphism in the continental crust, Gordon Research Conference, Tilton School, NH, *August 2010.*
Deformation of wet olivine aggregates at high confining pressures, Texas A&M University, *April 2010.*
Reading rheology from deformation fabrics, University of Tennessee, Knoxville, *February 2006*.
Development of fabrics and seismic anisotropy in mica-bearing shear zones, AGU meeting, *Dec. 2006*.
From the microscale to the megascale: an experimental study of the strength of the lithospheric mantle, University of Wisconsin-Milwaukee, *March 2005*.

FIELD-BASED COURSES AND FIELD TRIPS LED

FIELD CAMP II, Field course for undergraduate and graduate students on mapping in fold and thrust belts of Wyoming, University of Akron, June 2015.
A TRANSECT ACROSS THE NORTHERN APPALACHIANS, Field course for undergraduate and graduate students based in the New England Appalachians designed to demonstrate field-based data collection methods and relating outcrop-scale features to the processes responsible for orogenies, University of Tennessee, Knoxville, May 2007.
BROWN UNIVERSITY GEOLOGICAL SCIENCES SPRING FIELD TRIP, Led the field trip to Carlsbad Caverns, NM and Big Bend National Park, TX to explore evidence of western US tectonic events, March 2006.
BROWN UNIVERSITY GEOLOGICAL SCIENCES SPRING FIELD TRIP, Assisted Dr. Peter Gromet with developing and leading a field trip to central and western New Mexico to explore the structural and igneous features of Rio Grand Rift Valley, March 2002.
NEW ENGLAND INTERCOLLEGIATE GEOLOGICAL CONFERENCE, Co-led trip exploring the relation of features related to fluids present during deformation with Drs. Rolfe Stanley, Tracy Rushmer and Andrea Lini, October 1999.

PROFESSIONAL AFFILIATIONS

American Geophysical Union, 1998 to present
Sigma Xi Scientific Research Society, 2003 to present

PROFESSIONAL SERVICE

Consortium for Materials Properties Research in Earth Sciences (COMPRES) Elector for University of Akron, 2015 to present.

Consortium for Materials Properties Research in Earth Sciences (COMPRES) Elector for Texas A&M University, 2008 to 2014.

Reviewer for NSF Geophysics program, NSF Petrology and Geochemistry program, NSF Instrumentation and Facilities program, NSF Tectonics program, Contributions to Mineralogy and Petrology, Geology, Journal of Geophysical Research, Journal of Metamorphic Geology, Journal of Structural Geology, Scientific Reports, Tectonophysics, Tectonics.

REFERENCES

Dr. Andreas Kronenberg, Texas A&M University, kronenberg@geo.tamu.edu, (979) 845-0132
Dr. Ted Labotka, University of Tennessee, Knoxville, tlabotka@utk.edu, (865) 974-4805
Dr. Julie Newman, Texas A&M University, newman@geo.tamu.edu, (979) 845-9283
Dr. Steve Kirby, USGS (retired), stevenlyle@me.com (650) 329-4847

Additional references are available upon request.