



Smithsonian

*Curriculum Vitae*

# Megan Holycross

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**Current position:** Smithsonian Institution Peter Buck Postdoctoral Fellow

National Museum of Natural History, Department of Mineral Sciences

Smithsonian Institution

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<http://mineralsciences.si.edu/staff/pages/holycross.htm>

## **EDUCATION**

**Doctor of Philosophy in Geology**

August 2017

Rensselaer Polytechnic Institute, Troy, NY

*Advisor:* E. Bruce Watson

*Thesis:* Diffusive fractionation of trace elements and their isotopes in silicate melts

**Bachelor of Science in Environmental Geoscience, Honors**

May 2012

Michigan State University, East Lansing, MI

## **POSITIONS HELD**

**National Science Foundation Postdoctoral Fellow**

as of Sept. 2019

*Geology & Geophysics, Yale University*

*Mineral Sciences, National Museum of Natural History*

**Smithsonian Institution Peter Buck Postdoctoral Fellow**

Sept. 2017-Aug. 2019

*Mineral Sciences, National Museum of Natural History*

**Graduate Research Assistant**

2014-2017

*Earth and Environmental Sciences, Rensselaer Polytechnic Institute*

**Research Intern**

2015

*Glass Science, Corning Incorporated*

**Graduate Teaching Assistant**

2012-2014

*Earth and Environmental Sciences, Rensselaer Polytechnic Institute*

**NSF-REU Intern**

2011

*Earth and Planetary Sciences, American Museum of Natural History*

**Professorial Research Assistant**

2008-2012

*Earth and Environmental Sciences, Michigan State University*

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holycrossm@si.edu

### **PUBLICATIONS**

**Holycross M.E.**, Watson E.B. (2018) Trace element diffusion and kinetic fractionation in wet rhyolitic melt, *Geochimica et Cosmochimica Acta* 232: 14-29

**Holycross M.E.**, Watson E.B., Richter F., Villeneuve J. (2018) Diffusive fractionation of Li in wet, highly silicic melts, *Geochemical Perspectives Letters* 6: 39-42

**Holycross M.E.**, Watson E.B. (2016) Diffusive fractionation of trace elements in basaltic melt, *Contributions to Mineralogy and Petrology* 171: 1-15

Watson E.B., Cherniak D.J., **Holycross M.E.** (2015) Diffusion of phosphorus in olivine and molten basalt, *American Mineralogist* 100: 2053-2065

Brandt D.S., Csonka J., **Holycross M.**, McCoy V., Seitz M. (2012) In search of the Arthropycus parallelus tracemaker, *Palaios* 27: 116-121

#### *Manuscripts in review*

**Holycross M.**, Cottrell E. Partitioning of V and 19 other trace elements between rutile and silicate melt as function of oxygen fugacity and melt composition. Submitted to *American Mineralogist*, 2019

Osborne Z., Thomas J.B., Nachlas W., Baldwin S., **Holycross M.**, Spear F., Watson E.B. A thermobarometric solubility model for titanium in coesite (Titanic). Submitted to *Contributions to Mineralogy and Petrology*, 2019

#### *Manuscripts in preparation (available on request)*

**Holycross M.**, Watson E. B. Experimental calibration of the lithium-in-plagioclase geospeedometer for rapid heating events. In prep for *Earth and Planetary Science Letters*

### **FUNDING, FELLOWSHIPS and GRANTS**

National Science Foundation Earth Sciences Postdoctoral Fellowship 2019-2021  
*A new oxybarometer to quantify spatial and temporal scales of redox variation in subducting slabs*  
Value: \$174,000

Advanced Photon Source beam time proposal 2018-2020  
*Probing Earth's deep oxygen cycle with vanadium: a new  $fO_2$  proxy for high pressure metamorphic rocks*  
Score: 1.5  
Value: 54 shifts awarded @ Department of Energy in-kind value of \$180,000

Peter Buck Postdoctoral Fellowship, Smithsonian Institution 2017-2019  
*Partitioning of vanadium in high pressure systems as a function of oxygen fugacity*  
Value: \$132,000

Student Research Grant, Geological Society of America 2016  
*Titanium grain boundary diffusion in quartzite*  
Value: \$1,375

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**AWARDS**

Founder's Award of Excellence, Rensselaer Polytechnic Institute	2014
James Neal Research Scholarship, Michigan State University	2011
Honors College Scholarship, Michigan State University	2008-2012

**PRESENTATIONS**

*Invited*

University of Maryland Department of Geology Seminar Series	2019
Cornell University Department of Earth and Atmospheric Sciences	2019
Amherst College Department of Geology	2018
Geological Society of Washington, D.C.	2018
American Museum of Natural History Earth and Planetary Sciences Seminar Series	2018
National Museum of Natural History Department of Mineral Sciences Seminar Series	2017
Rice University Earth, Environmental and Planetary Sciences Department Colloquium	2017

*Conference abstracts; \* student presentation*

- Holycross M.**, Cottrell E. (2018) "Rutile controls on vanadium during eclogite partial melting", AGU Fall Meeting, Washington DC
- McKeegan R.\*, **Holycross M.**, Cottrell E. (2018) "Probing the Earth's deep oxygen cycle with vanadium: the temperature dependence of partitioning between rutile and silicate melt", GSA Annual Meeting, Indianapolis IN
- Holycross M.**, Watson E.B. (2018) "Li diffusion in plagioclase: a geospeedometer for rapid heating events", GSA Annual Meeting, Indianapolis IN
- Holycross M.**, Cottrell E. (2018) "A new oxybarometer for rutile", accepted for Goldschmidt conference, Boston MA
- Holycross M.E.**, Watson E.B. (2017) "Complex diffusion mechanism for Li in feldspar: re-thinking Li-in-plag geospeedometry", AGU Fall Meeting, New Orleans, LA
- Holycross M.E.**, Watson E.B., Richter F., Villeneuve J. (2017) "Diffusive fractionation of Li in wet, highly silicic melts", GSA Annual Meeting, Seattle WA
- Holycross M.E.**, Watson E.B. (2016) "Diffusive fractionation of 25 trace elements in basaltic and rhyolitic melt", AGU Fall Meeting, San Francisco, CA
- Holycross M.E.**, Watson E.B. (2016) "The compensation law for trace element diffusion in silicate melts" Research Nucleation Workshop, joint initiative between Rensselaer and Corning Inc., Troy, NY

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**Holycross M.E.**, Watson E.B. (2015) “Trace element diffusion in basaltic melt”, AGU Fall Meeting, San Francisco, CA

**Holycross M.**, Watson E.B. (2014) “Trace element diffusion in hydrous rhyolitic melt” Goldschmidt conference, Sacramento, CA

**Holycross, M.** (2011) “Sulfur solubility in silicic melts: an experimental study”, REU Summer Forum, American Museum of Natural History, New York, NY

### **TEACHING EXPERIENCE**

Graduate Teaching Assistant, Introduction to Geochemistry	2014
Graduate Teaching Assistant, Field Methods	2012, 2013
Graduate Teaching Assistant, Structural Geology	2013
Graduate Teaching Assistant, Geology II: Earth’s Surface	2013
Graduate Teaching Assistant, Earth Materials	2012

### **SYNERGISTIC ACTIVITIES and COMMUNITY OUTREACH**

Meeting Secretary Geological Society of Washington, D.C.	2019
Reviewer for <i>American Mineralogist</i> ; <i>Chemical Geology</i>	2018+
Research Experience for Undergraduates Site mentor Natural History Research Experiences NSF-REU Program National Museum of Natural History Washington, DC	2018
Volunteer science presenter Troy High Earth Day Celebration Troy, NY	2017
Science instructor Hoosick Falls Schools Career Day Troy, NY	2016
Earth and Environmental Sciences representative School of Science Graduate Student Council Rensselaer Polytechnic Institute, Troy, NY	2013-2015
Science activity coordinator Exxon Mobil Bernard Harris Summer Science Camp at Rensselaer Troy, NY	2014
Intern Mentor Emma Willard School STEM Internship Program Troy, NY	2012-2013
Student volunteer Darwin Day Celebration Science and Culture Museum, Michigan State University, East Lansing, MI	2009-2012