

# CLAIRE E. BUCHOLZ

Division of Geologic and Planetary Sciences  
248 Arms Laboratory, Mail Code: 170-25  
California Institute of Technology  
1200 East California Boulevard  
Pasadena, CA 91125  
E cbucholz@caltech.edu  
T 626-395-1315

## EDUCATION

- 2016 Ph.D. Geochemistry, MIT/WHOI Joint Program, Cambridge, MA, 2016  
*Chemical, Isotopic, and Temporal Variations during Crustal Differentiation*  
Principal Advisor: Prof. O. Jagoutz  
Committee: M. Behn (WHOI), S.A. Bowring, G.A. Gaetani (WHOI), T.L. Grove
- 2009 B.S. Geology and Geophysics, Yale University, CT, 2009  
*Fluid flow and Al transport during quartz-kyanite vein formation, Unst, Shetland Islands, Scotland*  
Principal Advisor: Prof. J.A. Ague

## PROFESSIONAL EXPERIENCE

- Sep 2017- present Assistant Professor, California Institute of Technology, CA  
Sep 2015-Aug 2017 O.K. Earl Postdoctoral Scholar in Geology, California Institute of Technology, CA  
2010-2015 Graduate Research Assistant, MIT/WHOI Joint Program, Cambridge, MA  
2010 Lab Technician, Laser Fluorination Oxygen Isotope Lab, Yale University, CT  
2009 High School Geology Teacher, Swiss Semester, Zermatt, Switzerland  
2008 Cripple Creek & Victor Mining Company Exploration Geologist Intern, CO

### *Leaves of absence:*

- May 2015-Aug 2015: Maternity leave (1<sup>st</sup> child, boy, Owen Robert McPhillips)  
Nov 2017-Mar 2018: Maternity leave (2<sup>nd</sup> child, girl, Margot Ann McPhillips)

## FELLOWSHIPS & AWARDS

- Rose Hills Foundation Innovator Fellowship for Junior Faculty (2017-2018)  
O.K. Earl Postdoctoral Fellowship – California Institute of Technology (2015-2017)  
National Science Foundation Graduate Research Fellowship (2012-2015)  
Award for Excellence in Teaching – Field Geology, MIT (2014)  
Ida M. Green Presidential Fellowship, MIT (2010-11)  
Hammer Prize for ‘excellence in the oral presentation of the senior thesis, Yale University, (2009)  
William R. Belknap Prize for ‘excellence in Geological Studies’, Yale University (2009)  
Magna Cum Laude, Yale University (2009)  
Phi Beta Kappa, Yale University (2009)  
Sherwood E. Silliman Fellowship Prize for ‘scientific research in the Natural Sciences conducted during the summer’, Yale University (2007)  
Samuel Lewis Penfield Prize for ‘proficiency in mineralogy’, Yale University (2006)

## TEACHING EXPERIENCE

- 2019 Ge120b: Summer Field Camp  
2019 Ge195: Enrichment Trip Seminar (topics on Arctic Canada and Alaska)  
2018, 2019 Ge123: Origin and Evolution of the Continental Crust (2019: focus on Alaskan Tectonics)  
2012-2014 Field Camp Teaching Assistant, MIT, Cambridge, MA and Mojave Desert, CA  
2013-2014 Structural Geology Teaching Assistant, MIT, Cambridge, MA (2013 & 2014)  
2009 High School Geology Teacher, Swiss Semester, Switzerland (2009)

## GRANTS

**NSF CAREER: Linking the stable isotope record of Earth’s surface and interior across the Great Oxidation Event**

EAR 1943629

Total: \$664,500, Awarded to date: \$230,500, 2020-2024

**NSF Petrology and Geochemistry** – Collaborative Research: Evaluating the Exhumation History of the Aleutians with Zircon and Apatite Thermochronology

PI Emily Cooperdock (USC) EAR 1949148, co-PI Claire Bucholz EAR 1949160

Final budget pending. Amount requested: \$311,203 to PI Cooperdock, \$38,334 to co-PI Bucholz 2020-2022

**NSF Petrology and Geochemistry** - “Fe<sup>3+</sup>/Fe<sup>T</sup> ratios in amphiboles – a new tool for understanding the redox state of arc magmas”

PI Claire Bucholz, co-PI Jennifer Jackson (Caltech). EAR 1841790. \$290K, 2019-2021.

**Richard Lounsbury Foundation** - *Understanding the Dynamics of Continental Crust Formation.*

PI Claire Bucholz, \$149,998. August 2017-August 2020

## PUBLICATIONS – Published or Submitted (\*indicates advised student or postdoc)

- (14) Liebmann, J.\*. Spencer CJ, Kirkland, CL, **Bucholz CE**, He X, Santosh M, Xia X, Martin L, Evans NJ. Emergence of continents above sea-level influences compositions of sediment melts. *Submitted to Nature Geosciences*.
- (13) **Bucholz, C. E.**, Biasi, J. A.\*., Beaudy, P., and Ono, S. Sulfur isotopes during metamorphism and anatexis of Archean sedimentary rocks: a case study from the Ghost Lake batholith, Ontario, Canada. *Submitted to Earth and Planetary Science Letters*.
- (12) **Bucholz, C. E.**, and Kelemen, P. B. 2019. Oxygen fugacity at the base of the Talkeetna arc, Alaska. *Contributions to Mineralogy and Petrology* 174(10): 79.
- (11) **Bucholz, C. E.**, and Spencer, C. J. 2019. Strongly peraluminous granites across the Archean-Proterozoic boundary. *Journal of Petrology* 60(7): 1299-1348.
- (10) Stolper, D. A. and **Bucholz, C. E.**, 2019. Neoproterozoic to early Phanerozoic rise in island arc redox state due to deep ocean oxygenation and increased marine sulfate levels. *Proceedings of the National Academy of Sciences* 116:18, 8746-8755.
- (9) **Bucholz, C. E.**, Stolper, E. M., Eiler, J. M., and Break, F. W. 2018. A comparison of oxygen fugacities of strongly peraluminous granites across the Archean-Proterozoic boundary. *Journal of Petrology* 59(11): 2123-2156.
- (8) **Bucholz, C. E.**, Jagoutz, O., Vantongeren, J. A., Setera, J., and Wang, Z. 2017. Oxygen isotope trajectories of crystallizing melts: Insights from modeling and the plutonic record. *Geochimica et Cosmochimica Acta* 207: 154-84.
- (7) **Bucholz, C. E.**, Eddy, M. P., Jagoutz, O., Schmidt, M.W., Sambuu, O., and Bowring, S. A. 2017. High Precision U-Pb zircon CA-ID-TIMS Age Constraints on Timescales of Magmatic Differentiation. *Geology* 45.1, 11-14.
- (6) **Bucholz, C. E.**, Jagoutz, O., Schmidt, M. W., & Sambuu, O. 2014b. Fractional Crystallization of High-K Arc Magmas: Biotite- vs. Amphibole-dominated Fractionation Series in the Dariv Igneous Complex, Western Mongolia. *Contributions to Mineralogy & Petrology* 168.5, 1072.
- (5) **Bucholz, C. E.**, Jagoutz, O., Schmidt, M. W., & Sambuu, O. 2014a. Phlogopite- and Clinopyroxene-dominated Fractional Crystallization of an Alkaline Primitive Melt: Petrology and Mineral Chemistry of the Dariv Igneous Complex, Western Mongolia. *Contributions to Mineralogy & Petrology* 167.4, 1-28.
- (4) **Bucholz, C. E.**, Gaetani, G. A., Behn, M. D., Shimizu, N., and Newville, M., 2013. Post-Entrapment Modification of Volatiles and Oxygen Fugacity in Olivine-Hosted Melt Inclusions. *Earth and Planetary Science Letters*, 374, 145-155.
- (3) Gaetani, G. A., O’Leary, J. A., Shimizu, N., **Bucholz, C. E.**, & Newville, M. 2012. Rapid Re-equilibration of H<sub>2</sub>O and Oxygen Fugacity in Olivine Hosted Melt Inclusions. *Geology* 40, 915-918.
- (2) Wang, Z., **Bucholz, C.**, Skinner, B., Shimizu, N., & Eiler, J. 2011. Oxygen isotope constraints on the origin of high-Cr garnets from Kimberlites. *Earth and Planetary Science Letters* 312, 337-347.
- (1) **Bucholz, C. E.** & Ague, J. J. 2010. Fluid flow and Al transport during quartz-kyanite vein formation, Unst, Shetland Islands, Scotland. *Journal of Metamorphic Geology* 28, 19-39.

## MEETING ABSTRACTS (\*indicates advised student or postdoc)

- Worthington, J. R.\*, **Bucholz, C.E.**, Bold, U., Macdonald, F. A. Neoproterozoic tectonic evolution of the ophiolitic Bayankhongor suture zone, Central Asian Orogenic Belt (Central Mongolia). GSA Annual Meeting, Phoenix, Arizona, 2019.
- Liebmann, J., Spencer, C. J., Kirkland, C., **Bucholz, C. E.**, He, X., Tang, L., Santosh, M., Xia, X., Martin, L., and Evans, N. Emergence of continents above sea-level influences composition of sediment melts. Goldschmidt, Barcelona, Spain, 2019.
- Bucholz, C. E.** and Biasi, J. A.\* Sulfur isotope systematics during partial melting of Archean sedimentary rocks: a case study from the Ghost Lake batholith, Ontario, Canada. Gordon Conference, Mt. Holyoke College, Massachusetts, June 2019.
- Ratschbacher, B. C.\*, **Bucholz, C. E.**, Jackson, J. M., and Solomatova, N. V. Variations in Fe<sup>3+</sup>/Fe<sup>T</sup> ratios in volcanic amphibole as a function of magmatic oxygen fugacity and mineral composition. AGU Fall Meeting, San Francisco, 2018.
- Lewis, M. J.\*, **Bucholz, C. E.**, and Jagoutz, O. E. Polybaric crystallization of hydrous basalts in a continental arc: evidence from Hidden Lakes mafic complex, Sierra Nevada batholith, California. AGU Fall Meeting, San Francisco, 2018.
- Bucholz, C. E.** and Kelemen, P. Oxygen fugacity at the base of the Talkeetna Arc, Alaska. Goldschmidt, Boston, MA. 2018.
- Stolper, D. and **Bucholz, C.** A Phanerozoic increase in arc rock oxidation state. Goldschmidt, Boston, MA. 2018.
- Gatti, E., **Bucholz, C.**, Guan, Y., Zhang, Y., Gaetani, G., and Eiler, J. dD variations in olivine-hosted melt inclusions due to post-entrapment processes: a case study from Baffin Island picrites. Goldschmidt, Boston, MA. 2018.
- Barickman, M. H.\*, **Bucholz, C. E.**, Kay, S. M., and Kay, R. W. Petrology and geochemistry of Adak Island plutonic xenoliths: implications for crustal differentiation in the Aleutian island arc. GSA Annual Meeting, Seattle, WA. 2017.
- Lewis, M\*, **Bucholz, C. E.**, Jagoutz, O.E., and Eddy, M.P. Petrology and geochemistry of an upper crustal mafic complex – Hidden Lakes, Sierra Nevada Batholith, California. AGU, New Orleans, LA, 2017.
- Bucholz, C. E.**, Eiler, J. M., Stolper, E.M., & Breaks, F. W. Comparison of oxygen fugacities of S-type granites across the Archean-Proterozoic boundary. AGU, San Francisco, CA, 2016.
- Biasi, J.\*, Asimow, P.D., and **Bucholz, C.E.** Evolution and Eruptibility of Magma Reservoirs. Modeling Results from the Western Peninsular Ranges Batholith. AGU, San Francisco, CA, 2016.
- Bucholz, C. E.**, Eddy, M. P., Jagoutz, O., & Bowring, S. Constraining the Timescales of Magmatic Differentiation with U-Pb Zircon Geochronology. AGU, San Francisco, CA, 2015.
- Bucholz, C. E.**, Jagoutz, O., VanTongeren, J. A., & Wang, Z. Oxygen Isotope Trajectories of Crystallizing Arc Magmas. AGU, San Francisco, CA, 2014.
- Bucholz, C. E.**, Gaetani, G. A., & Behn, M. D. Modeling Post-Entrapment Modification of Volatile Contents in Olivine-Hosted Melt Inclusions from Mid-Ocean Ridges. AGU, San Francisco, CA, 2014. (invited)
- Bucholz, C. E., Jagoutz, O., & Schmidt, M. W. Many Roads Lead to Granite: A Field Study of a High-K LLD. Goldschmidt, Sacramento, CA, 2014.
- Bucholz, C. E.**, Gaetani, G. A., Behn, M. D., Shimizu, N., Newville, M., & Monteleone, B. Volatile Records in Olivine-Hosted Melt Inclusions: What Can We Actually Learn From Them? Goldschmidt, Sacramento, CA, 2014. (invited)
- Bucholz, C. E.**, Jagoutz, O., & Schmidt, M. W. A Field and Geochemical Study of the Hydrous Fractionation of an Alkaline Primitive Arc Melt: the Dariv Igneous Complex, Western Mongolia. Geological Society of America Meeting, Denver, CO, 2013.
- Jagoutz, O. and **Bucholz, C. E.** What controls the chemical stratification of an entire arc's crust? Geological Society of America Meeting, Denver, CO, 2013.
- Gaetani, G. A., **Bucholz, C.**, Rose-Koga, E., Shimizu, N., Koga, K., and Monteleone, B. Reading the Melt Inclusion Record of Pre-eruptive Magmatic Volatiles. Goldschmidt, Florence, Italy, 2013.
- Bucholz, C. E.**, Gaetani, G. A., and Behn, M. D. Diffusive Re-equilibration of Volatiles and Oxygen Fugacity in Olivine-Hosted Melt Inclusions: Experiments and Numerical Models. American Geophysical Union Meeting, 2011.

Gaetani, G. A., O'Leary, J.A., Shimizu, N. and **Bucholz, C.**, Decoupling of Water, Oxygen Fugacity and Incompatible Elements in Olivine-Hosted Melt Inclusions by Diffusive Re-Equilibration. American Geophysical Union Meeting, 2010.

## INVITED TALKS

UC Riverside - Department of Earth & Planetary Sciences – Hewett Club Seminar (October 2019)  
Johns Hopkins University – Department of Earth & Planetary Sciences – Bromery Lecture (October 2019)  
U. Oregon – Department of Earth Sciences (April 2019)  
UC Berkeley – EPS Seminar (October 2018)  
UCSB – Speakers Club (October 2017)  
UCLA – Geocheminar (May 2017)  
Lamont Doherty Earth Observatory – Geochemistry Seminar (February 2017)  
Yale University – Dept. of Geology and Geophysics (March 2016)  
Stanford University – Dept. of Geological Sciences Seminar (October 2015)  
Harvard University – EPS Department Colloquium (March 2015)  
University of Southern California – Dept. of Earth Sciences (February 2015)  
California Institute of Technology – GPS Division Seminar (November 2014)  
California Institute of Technology – GPS Tectonic Observatory Lunch (November 2014)  
Goldschmidt Sacramento – Keynote Speaker (June 2014)  
Harvard University – BISEPPS (November 2013)  
Mongolian University of Science and Technology – (June 2012)

## PROFESSIONAL AFFILIATIONS AND SERVICE

### Affiliations

American Geophysical Union (2008-present)  
Geological Society of America (2008-present)  
Mineralogical Society of America (2010-present)

*Reviewer for journals including:* Contributions to Mineralogy and Petrology; Geochemistry, Geophysics, Geosystems; American Mineralogist; Geology; Journal of Petrology, Nature Communications

*Reviewer for funding agencies including:* National Science Foundation

### Committee Work

2019-2020      Caltech Library Committee

## FIELD EXPERIENCE

South Dakota and Wyoming – Igneous Petrology (2018)  
Ontario, Superior Province – Igneous Petrology (2016, 2017)  
Eastern Sierra Nevada, California - Igneous Petrology (2014, 2016, 2017, 2018, 2019)  
Indian Himalayas – Paleomagnetic Sampling (2013)  
Western Mongolia – Igneous Petrology/Regional Tectonics (2011, 2012)  
Mojave Desert, California – MIT Field Camp (2011, 2013, 2014)  
Ticino, Switzerland – Keck Consortium, Igneous/Structural Geology (2007)  
Glen Clova, Scotland – Metamorphic Petrology (2007)  
Shetland Islands, Scotland – Metamorphic Petrology (2006)