

EDUCATION

University of Oregon Ph.D., Geological Sciences	Eugene, Oregon June 2011
Louisiana State University B.S., Geology, <i>Magna Cum Laude</i>	Baton Rouge, Louisiana August 2006
University of Leicester Study Abroad	Leicester, United Kingdom September 2004–May 2005

PROFESSIONAL EXPERIENCE

Research Geologist U.S. Geological Survey, Menlo Park, California	January 2016–present
Mendenhall Postdoctoral Research Fellow U.S. Geological Survey, Menlo Park, California	January 2012–January 2016
Graduate Teaching Fellow Department of Geological Sciences, University of Oregon, Eugene, Oregon	September 2006–June 2011

HONORS AND AWARDS

- 2015 U.S. Geological Survey Performance Award
- 2014 U.S. Geological Survey Performance Award
- 2013 Geosphere Exceptional Reviewer
- 2013 U.S. Geological Survey Performance Award
- 2012 U.S. Geological Survey Performance Award
- 2012 U.S. Geological Survey Mendenhall Postdoctoral Fellowship
- 2010 University of Oregon Staples Research Fellowship
- 2010 University of Oregon Weiser Scholarship
- 2008 National Science Foundation grant for IAVCEI research conference
- 2008 University of Oregon Staples Scholarship
- 2008 University of Oregon Baldwin Research Scholarship
- 2007 U.S. Geological Survey Jack Kleinman Memorial Fund Grant for Volcano Research
- 2007 National Science Foundation travel grant for MAG research conference
- 2007 Society of Exploration Geophysicists Graduate Scholarship
- 2006 Outstanding Senior of Louisiana State University Geology Department
- 2006 Louisiana State University Field Camp Scholarship
- 2005 Shell Oil Foundation Scholarship
- 2004 Outstanding Junior of Louisiana State University Geology Department
- 2004 New Orleans Geological Society Scholarship
- 2004 Louisiana State University Study Abroad Scholarship
- 2003 Society of Exploration Geophysicists Scholarship (4 years)
- 2002 Tuition Opportunity Program for Students Scholarship (4 years)

RESEARCH GRANTS

- 2014: U.S. Geological Survey, Mineral Resources Program: "Magmas to Metals: Melt Inclusion Insights into the Formation of Critical Element-Bearing Ore Deposits." Co-PI: Celeste Mercer (USGS Denver). Salary and research operating expenses for K. Watts, C. Mercer and team members, FY 2015–2017.

2012: U.S. Geological Survey, Mendenhall Research Fellowship Program: "Formation and Eruption of Large Silicic Magma Chambers and Their Potential Genetic Relationship to Carlin-Type Gold Deposits in the Northern Great Basin." Salary and research operating expenses for K. Watts, FY 2012–2014.

2007–2010: Numerous small grants (<\$5,000) for graduate research from the University of Oregon, U.S. Geological Survey, National Science Foundation, and Society of Exploration Geophysicists.

PUBLICATIONS

Colgan, J.P., John, D.A., Henry, C.D. and **Watts, K.E.** (to be submitted) Crustal-scale perspective on the rapid development of Oligocene silicic calderas and related underlying plutonic systems, western Nevada, USA. *Journal of Volcanology and Geothermal Research*.

Watts, K.E., John, D.A., Colgan, J.P., Henry, C.D., Bindeman, I.N. and Schmitt, A.K. (in press) Probing the volcanic-plutonic connection and the genesis of crystal-rich rhyolite in a deeply dissected supervolcano in the Nevada Great Basin: Source of the late Eocene Caetano Tuff. *Journal of Petrology*. IP-064750.

Watts, K.E., Coble, M.A., Vazquez, J.A., Henry, C.D., Colgan, J.P. and John, D.A. (2016) Chemical abrasion-SIMS (CA-SIMS) U-Pb dating of zircon from the late Eocene Caetano caldera, Nevada. *Chemical Geology*, vol. 439, 139-151. IP-052891.

Wotzlaw, J.F., Bindeman, I.N., **Watts, K.E.**, Schmitt, A.K., Caricchi, L. and Schaltegger, U. (2014) Linking rapid magma reservoir assembly and eruption trigger mechanisms at evolved Yellowstone-type supervolcanoes. *Geology*, vol. 42, no. 9, 807-810. IP-057603.

Retallack, G.J., Marconato, A., Osterhout, J.T., **Watts, K.E.** and Bindeman, I.N. (2014) Revised Wonoka isotopic anomaly in South Australia and Late Ediacaran mass extinction. *Journal of the Geological Society of London*, vol. 171, no. 5, 709-722. IP-053909.

Drew, D., Bindeman, I.N., **Watts, K.E.**, Schmitt, A.K., Fu, B. and McCurry, M. (2013) Crustal-scale recycling in caldera complexes and rift zones along the Yellowstone hotspot track: O and Hf isotopic evidence in diverse zircons from voluminous rhyolites of the Picabo volcanic field, Idaho. *Earth and Planetary Science Letters*, vol. 381, 63-77.

Watts, K.E., Bindeman, I.N. and Schmitt, A.K. (2012) Crystal-scale anatomy of a dying supervolcano: An isotope and geochronology study of individual phenocrysts from voluminous rhyolites of the Yellowstone caldera. *Contributions to Mineralogy and Petrology*, vol. 164, 45-67.

Watts, K.E., Bindeman, I.N. and Schmitt, A.K. (2011) Large-volume rhyolite genesis in caldera complexes of the Snake River Plain: Insights from the Kilgore Tuff of the Heise volcanic field, Idaho, with comparison to Yellowstone and Bruneau-Jarbidge rhyolites. *Journal of Petrology*, vol. 52, no. 5, 857-890.

Watts, K.E., Leeman, W.P., Bindeman, I.N. and Larson, P.B. (2010) Supereruptions of the Snake River Plain: Two-stage derivation of low- $\delta^{18}\text{O}$ rhyolites from normal- $\delta^{18}\text{O}$ crust as constrained by Archean xenoliths. *Geology*, vol. 38, no. 6, 503-506.

Bindeman, I.N., Leonov, V.L., Ponomareva, V.V., **Watts, K.E.**, Shipley, N.K., Perepelov, A.B., Bazanova, L.I., Jicha, B.R., Singer, B.S., Schmitt, A.K., Portnyagin, M.V. and Chen, C.H. (2010) Large-volume silicic volcanism in Kamchatka: Ar-Ar and U-Pb ages, isotopic, and geochemical characteristics of major pre-Holocene caldera-forming eruptions. *Journal of Volcanology and Geothermal Research*, vol. 189, 57-80.

Bindeman, I.N., **Watts, K.E.**, Schmitt, A.K., Morgan, L.A. and Shanks, P.W. (2007) Voluminous low $\delta^{18}\text{O}$ magmas in the Late Miocene Heise volcanic field, Idaho: Implications for the fate of Yellowstone hotspot calderas. *Geology*, vol. 35, no. 11, 1019-1022.

Watts, K.E. (2007) Yellowstone and Heise: Supervolcanoes that lighten up. *Geotimes (now Earth)*, vol. 52, no. 11, 24-29.

PUBLISHED ABSTRACTS

Watts, K.E., Mercer, C.N., and Vazquez, J.A. (2015) Geochemical and geochronologic investigations of zircon-hosted melt inclusions in rhyolites from the Mesoproterozoic Pea Ridge IOA-REE deposit, St. Francois Mountains, Missouri. American Geophysical Union, Fall Meeting 2015.

John, D.A., Colgan, J.P., **Watts, K.E.**, Henry, C.D. and Cousens, B.L. (2015) Geochemical and isotopic data for Oligocene ignimbrites, calderas, and granitic plutons, southern Stillwater Range and Clan Alpine Mountains: Insights into the volcanic-plutonic connection and crustal evolution in western Nevada. American Geophysical Union, Fall Meeting 2015.

Colgan, J.P., John, D.A., Henry C.D. and **Watts, K.E.** (2015) Crustal-scale perspective on the rapid development of Oligocene silicic calderas and related underlying plutonic systems, western Nevada, USA. American Geophysical Union, Fall Meeting 2015.

Mercer, C.N., **Watts, K.E.**, Meighan, C.J. and Bennett, M.M. (2015) Mineral and melt inclusion constraints on the petrogenesis of regional magmas and magnetite ore from the Pea Ridge (IOA-REE) and Boss Bixby (IOCG) deposits, USA. Society of Economic Geologists Conference 2015, Hobart, Tasmania.

Watts, K.E., John, D.A., Coble, M.A., Colgan, J.P. and Henry, C.D. (2014) Ion microprobe study of Au and trace metals in sulfide melt inclusions from a rhyolite porphyry intrusion in the Caetano caldera, Nevada. Geological Society of America, Annual Meeting 2014.

John, D.A., Henry, C.D., Colgan, J.P. and **Watts, K.E.**, (2014) $^{40}\text{Ar}/^{39}\text{Ar}$ and U-Pb ages of silicic ignimbrites, calderas, and granitic plutons, southern Stillwater Range and Clan Alpine Mountains, Nevada: Linkages between volcanic and plutonic rocks. Geological Society of America, Annual Meeting 2014.

Watts, K.E., Colgan, J.P., John, D.A., Henry, C.D., Coble, M.A. and Hervig, R.L. (2013) Ion microprobe study of Au and Carlin-type trace metals in rhyolite melt inclusions from Eocene dikes and ash-flow tuff in northern Nevada. American Geophysical Union, Fall Meeting 2013.

Colgan, J.P., **Watts, K.E.**, Henry, C.D. and John, D.A. (2013) Characterizing the geographic variability in magma composition and eruptive style during voluminous mid-Tertiary magmatism in the northern Great Basin using zircon U-Pb and oxygen isotopic data. American Geophysical Union, Fall Meeting 2013.

John, D.A., **Watts, K.E.**, Hofstra, A.H., Colgan, J.P., Henry, C.D. and Bindeman, I.N. (2013) Stable isotopes of tilted ignimbrite calderas in Nevada. American Geophysical Union, Fall Meeting 2013.

Watts, K.E., Colgan, J.P., John, D.A. and Henry, C.D. (2013) Dissected caldera provides a window into the linked volcanic-plutonic origins of the 34 Ma Caetano Tuff supereruption, Nevada. Geological Society of America, Annual Meeting 2013.

Watts, K.E., Colgan, J.P., John, D.A. and Henry, C.D. (2012) Petrologic evolution of the Caetano magmatic system: What can we learn from a dissected, 34 Ma caldera in the northern Great Basin, western U.S.A.? American Geophysical Union, Fall Meeting 2012.

Colgan, J.P., **Watts, K.E.**, John, D.A., Henry, C.D., Coble, M.A. and Vazquez, J.A. (2012) Chemical-abrasion SIMS dating of zircon from the Eocene Caetano caldera, Nevada. American Geophysical Union, Fall Meeting 2012.

Drew, D., Bindeman, I.N., **Watts, K.E.** and McCurry, M. (2012) Rhyolite genesis at the Picabo Volcanic Center of the Snake River Plain: Progressive recycling of hydrothermally altered rhyolites revealed by high resolution analysis of individual zircons. American Geophysical Union, Fall Meeting 2012.

Watts, K.E., Colgan, J.P., John, D.A., Bindeman, I.N., Schmitt, A.K. and Henry, C.D. (2012) Large-volume silicic magma genesis at Yellowstone, Heise, and Caetano: Isotope and geochronology insights from three supervolcanoes in the western U.S.A. Goldschmidt Conference 2012, Montreal, Canada.

Watts, K.E., Bindeman, I.N. and Schmitt, A.K. (2010) An ion microprobe study of individual zircon phenocrysts from voluminous post-caldera rhyolites of the Yellowstone caldera. American Geophysical Union, Fall Meeting 2010.

Watts, K.E., Bindeman, I.N. and Schmitt, A.K. (2009) Oxygen isotope study of Archean xenoliths constrains the source of supervolcanic rhyolites in the Snake River Plain-Yellowstone Plateau volcanic province. Geological Society of America, Annual Meeting 2009.

Retallack, G.J., Bindeman, I.N. and **Watts, K.E.** (2009) Stable isotopic evidence for Neoproterozoic life on land. Geological Society of America, Annual Meeting 2009.

Watts, K.E., Bindeman, I.N. and Schmitt, A.K. (2009) The Kilgore Tuff: An archetypal example of voluminous low- $\delta^{18}\text{O}$ rhyolite genesis and analog for Yellowstone eruptions. Geological Society of America Penrose Conference, Twin Falls, Idaho and Yellowstone National Park, Wyoming.

Watts, K.E., Bindeman, I.N. and Schmitt, A.K. (2008) Insights from the Kilgore Tuff: Surprising homogeneity of supervolcanic magmas in Yellowstone hotspot calderas. American Geophysical Union, Fall Meeting 2008.

Bindeman, I.N., Leonov, V.L., Ponomareva, V.V., **Watts, K.E.**, Perepelov, A.B., Bazanova, L.I., Singer, B.S., Jicha, B.R. and Schmitt, A.K. (2008) Large volume silicic volcanism in Kamchatka: Ar-Ar and U-Pb ages and geochemical characteristics of major pre-Holocene caldera-forming eruptions. American Geophysical Union, Fall Meeting 2008.

Watts, K.E., Bindeman, I.N. and Schmitt, A.K. (2008) Silicic magma genesis in the Yellowstone hotspot track: Shallow crustal recycling as revealed by oxygen isotope ratios and zircon geochronology of individual phenocrysts. International Association of Volcanology and Chemistry of the Earth's Interior General Assembly, Reykjavik, Iceland.

Watts, K.E. and Bindeman, I.N. (2007) Voluminous low- $\delta^{18}\text{O}$ magmas in the Late Miocene Heise volcanic field, Idaho: Implications for the fate of Yellowstone hotspot calderas. Geological Society of America, Annual Meeting 2007.

Watts, K.E. and Bindeman, I.N. (2007) Low- $\delta^{18}\text{O}$ magmas in the Late Miocene Heise volcanic field, Idaho: Implications for the fate of Yellowstone hotspot calderas. Magmas and Gases International Conference, Taipei, Taiwan.

PRESENTATIONS

- 2016: Gordon Research Conference on the Geochemistry of Mineral Deposits, Les Diablerets, Switzerland (poster)
- 2015: American Geophysical Union Fall Meeting, San Francisco, California (talk)
- 2015: Stanford Economic Geology Association Seminar, Stanford University, California (invited talk)
- 2014: Geological Society of America Annual Meeting, Vancouver, Canada (talk)
- 2014: Colorado School of Mines Department Seminar, Golden, Colorado (invited talk)
- 2014: California State University Pomona Department Seminar, Pomona, California (invited talk)
- 2013: American Geophysical Union Fall Meeting, San Francisco, California (poster)
- 2013: University of California Berkeley Department Seminar, Berkeley, California (invited talk)
- 2013: San Jose State University Department Seminar, San Jose, California (invited talk)
- 2013: University of Alaska Anchorage Department Seminar, Anchorage, Alaska (invited talk)
- 2013: University of California Davis Department Seminar, Davis, California (invited talk)
- 2013: Geological Society of America Annual Meeting, Denver, Colorado (talk)
- 2012: American Geophysical Union Fall Meeting, San Francisco, California (talk and poster)
- 2012: U.S. Geological Survey Western Region Colloquium, Menlo Park, California (talk and poster)
- 2012: Goldschmidt Meeting, Montreal, Canada (invited talk)
- 2012: U.S. Geological Survey Seminar, Menlo Park, California (invited talk)
- 2011: Colby College Department Seminar, Waterville, Maine (invited talk)
- 2011: University of Oregon Graduate Student Seminar, Eugene, Oregon (talk)
- 2010: American Geophysical Union Fall Meeting, San Francisco, California (talk)
- 2010: University of Oregon Graduate Student Seminar, Eugene, Oregon (talk)
- 2009: Geological Society of America Annual Meeting, Portland, Oregon (poster)

- 2009: Geological Society of America Penrose Conference, Twin Falls, Idaho and Yellowstone National Park, Wyoming (talk)
- 2008: American Geophysical Union Fall Meeting, San Francisco, California (talk)
- 2008: International Association of Volcanology and Chemistry of the Earth's Interior General Assembly, Reykjavik, Iceland (talk)
- 2008: Cascades Volcano Observatory Kleinman Series Seminar, Vancouver, Washington (talk)
- 2008: University of Oregon Graduate Student Seminar, Eugene, Oregon (talk)
- 2007: Geological Society of America Annual Meeting, Denver, Colorado (talk)
- 2007: Magmas and Gases International Conference, Taipei, Taiwan (poster)

ANALYTICAL EQUIPMENT EXPERIENCE

- Sensitive High Resolution Ion Microprobe with Reverse Geometry (SHRIMP-RG) used for U-Pb geochronology and trace element analysis of zircon, and trace metal analysis of silicate and sulfide melt inclusions
- CAMECA IMS 1270 ion microprobe used for high resolution U-Pb and U-Th geochronology and oxygen isotope analysis of zircon
- CAMECA IMS 6F ion microprobe used for trace metal analysis of rhyolite melt inclusions
- CAMECA SX100 and JEOL-8900 electron microprobes used for major and trace element analysis of minerals and glasses
- JEOL 5600 LV, Hitachi S-3500N, FEI Quanta 200, and Tescan VEGA scanning electron microscopes (SEM) used for high resolution mineral characterization
- Thermo Finnigan MAT 253 mass spectrometer used for oxygen isotope ratio determinations of silicate minerals and gases
- Thermo Finnigan GasBench II used for oxygen and carbon isotope ratio determinations of carbonate minerals and waters
- Thermo Finnigan TC/EA used for hydrogen and oxygen isotope analysis of hydrous minerals and waters
- Thermo Finnigan Element 2 HR-ICP-MS with laser ablation used for lead isotope analysis of silicate minerals
- Petrographic microscopes for transmitted and reflected light rock and mineral thin section characterization

TEACHING EXPERIENCE

- Geochemical Thermodynamics University of Oregon, Winter 2010
- Provided guidance for weekly course assignments and graded course materials for a curriculum that dealt with the fundamental principles of thermodynamics applied to geochemistry, petrology and volcanology, including equilibrium phase diagrams and the thermodynamics of gases, liquids and solid solutions
- Earth Materials University of Oregon, Fall 2009
- Provided instruction for the laboratory portion of the course, graded weekly laboratory assignments, wrote and proctored a midterm and final exam, and occasionally lectured for the course professor
 - Topics covered: crystallography, physical properties of minerals, mineral identification, intrusive and extrusive igneous rocks, sedimentary rock suites and structures, and metamorphic rocks, zones and textures
- Introduction to Petrology University of Oregon, Spring 2009
- Designed and organized the laboratory portion of the course, generated weekly lectures and assignments, provided petrographic microscope instruction, organized rock thin sections and hand samples, wrote and proctored a midterm and final exam, and co-led a field-trip to the northern Klamath mountains with the course professor
 - Topics covered: mineral identification, igneous phase diagrams, magma differentiation and crystal fractionation, subduction zone, mid-ocean ridge and hotspot volcanism, and metamorphic minerals and textures
- Environmental Geology and Landform Development University of Oregon, Winter 2008
- Organized weekly lesson plans and laboratory assignments, led meetings to instruct graduate student teaching assistants for weekly teaching assignments, set-up and maintained the Blackboard course website, prepared and proctored all lecture exams, and co-led a field-trip to the Oregon coast with the course professor
- Aqueous Geochemistry University of Oregon, Spring 2008
- Graded homework assignments and provided guidance in the weekly computer lab sessions that covered basic principles of aqueous-mineral-gas geochemistry of shallow crustal waters, including aqueous equilibria and

related geologic processes of weather, evaporation, diagenesis, hydrothermal alteration, and boiling and acid rock drainage

Environmental Geology and Landform Development

University of Oregon, Winter 2007

- Provided instruction, performed demonstrations, and graded the undergraduate laboratory course which emphasized large scale geologic processes including the rock cycle, hydrologic cycle, glaciers and climate, rivers and flooding, mass wasting and erosion, and coastal processes

Isotope Geochemistry

University of Oregon, Spring 2007

- Assisted the course professor in structuring lectures and grading assignments that covered basic principles and applications of radiogenic and stable isotopic systems, including nucleosynthesis, geochronology, crust, mantle and oceanic isotopic reservoirs, cosmogenic nuclides, stable isotope thermometry, hydrology, paleoclimatology, and mass-independent isotope effects

Earth's Dynamic Interior

University of Oregon, Fall 2006

- Designed, instructed, and graded undergraduate laboratory exercises for a broad range of introductory geology topics including the solar system, rock and mineral identification, plate tectonics, volcanoes, earthquakes, and relative and radiometric dating

PROFESSIONAL ACTIVITIES

Geological Society of America Fall Meeting

Vancouver, Canada

October 2014

- Co-convened a session entitled "Mapping the Temporal and Compositional Evolution of Subvolcanic Systems"

American Geophysical Union Fall Meeting

San Francisco, California

December 2012

- Co-convened a session entitled "Calderas: Genesis, Evolution, and Eruption of Large Silicic Magma Chambers—Petrology and Thermal Evolution"

U.S. Geological Survey Western Region Colloquium for Postdocs and New Scientists

Menlo Park Campus, Menlo Park, California

September 2012

- Organized a colloquium that included abstracts, oral presentations, posters, and a panel discussion to introduce new postdocs and scientists in the Western Region

Atlas of Yellowstone Project

July 2010–June 2011

Department of Geography, University of Oregon, Eugene, Oregon

- Served as a contributing expert, writing the text and designing the scientific data layout for the geology and volcano atlas pages

U.S. Geological Survey Jack Kleinman Internship for Volcano Research

May 2008

Cascades Volcano Observatory, Vancouver, Washington

- Presented graduate research on Yellowstone volcanism as a part of the U.S. Geological Survey Jack Kleinman Memorial Fund Seminar Series

OUTREACH ACTIVITIES

Bay Area Science Festival

November 2014 & 2015

AT&T Park, San Francisco, California

- Created and led a hands-on, interactive volcano exhibit for Discovery Day at AT&T Park: "What controls a volcano's eruptive style?"
- Provided an informal science education venue for an estimated 30,000 participants to learn about volcanoes and volcanic hazards

American Association for the Advancement of Science Annual Meeting

February 2015

San Jose Convention Center, San Jose, California

- Led a two-day hands-on volcano exhibit for Family Science Days
- Interacted with kids and adults as they explored volcano behavior and answered questions about geologic concepts, scientific research and science jobs

Bay Area Scientists in Schools

September 2013

University of California Berkeley, Berkeley, California

- Presented hands-on earth science lesson plans in K–5 classrooms to inspire enthusiasm for science learning and collaboration between teachers and scientists in the Bay Area

U.S. Geological Survey Open House

May 2012

Menlo Park Campus, Menlo Park, California

- Represented the Yellowstone Volcano Observatory in a public education exhibit that showcased scientific research and monitoring in Yellowstone National Park

Down to Earth: A Geologist's Perspective

November 2009–February 2010

Museum of Natural and Cultural History, University of Oregon, Eugene, Oregon

- Coordinated a fundraising exhibit of geology photographs taken by graduate students and professors in the University of Oregon Department of Geological Sciences

Undergraduate Catalytic Outreach and Research Experiences

June–August 2009

University of Oregon Stable Isotope Laboratory, Eugene, Oregon

- Trained and supervised a Portland Community College student during a 10-week summer research program that included mineral extraction, mass-spectrometric measurements of oxygen isotope ratios of minerals, and data processing in Excel

Undergraduate Catalytic Outreach and Research Experiences

June–August 2008

University of Oregon Stable Isotope Laboratory, Eugene, Oregon

- Trained and supervised a Lane Community College student during a 10-week summer research program that included assembly of a cryogenic vacuum line for carbonate CO₂ analyses and data acquisition and synthesis from experiments

PEER REVIEW

Contributions to Mineralogy and Petrology
Earth and Planetary Science Letters
Geochemistry, Geophysics, Geosystems (G³)
Geological Society of America Bulletin
Geological Society of America Today
Geology
Geophysical Research Letters
Geosphere
Journal of Petrology
National Science Foundation

MEMBERSHIP IN PROFESSIONAL SOCIETIES

American Geophysical Union
Earth Science Women's Network
Geological Society of America
Mineralogical Society of America
National Association of Geoscience Teachers
Society of Economic Geologists