

Benjamin Z. Klein

Institute of Earth Sciences
University of Lausanne
Geopolis Room 3640
1015 Lausanne, Switzerland

email: benjaminzachary.klein@unil.ch

mobile (Swiss): +41 78 220 06 64

mobile (USA): +1 973-634-0700

website: www.benklein.rocks

Education

Massachusetts Institute of Technology, Cambridge, MA

PhD, Geology, January 2019

Thesis: *Processes and Rates of Arc Crust Growth and Differentiation in the Southern Sierra Nevada Crustal Section, California*

Advisor: Professor Oliver Jagoutz

Amherst College, Amherst, MA

B.A. in Geology, May 2010

Thesis: *Metamorphism of sillimanite-garnet-biotite-K-feldspar gneiss in the Highland Mountains of southwest Montana*

Advisors: Professors Tekla Harms and Jack Cheney

University of Canterbury, Christchurch, New Zealand

Geology field camp and semester abroad, 2009

Work and Teaching Experience

Postdoctoral Research Fellow – University of Lausanne, 2021-

Postdoctoral Research Scientist – Boston College, 2019-2021

Graduate Research Assistant – MIT, 2012-2018

Post-Bachelors Research Assistant – Los Alamos National Laboratory, 2011 – 2012

Summer REU – College of Oceanic and Atmospheric Science, Oregon State University, 2008

Summer Research Assistant – Amherst College, Summer 2007

Teaching Experience

Lecturer, Physics and Structure of minerals, UNIL, 2022, 2023, 2024

Bachelors and Master's Student Alpine Geology Field Trips, UNIL, 2022, 2023, 2024

Field Camp, MIT and Mojave Desert, 2016, 2018

Introduction to Geophysics and Planetary Science, MIT, 2015

Introduction to Geology, MIT, 2014

Mineralogy, Amherst College, 2009

Introduction to Geology, Amherst College, 2007, 2008

Completed Kaufman Teaching Certificate Course at MIT, spring 2018

Primary advisor to two master's student theses at University of Lausanne, 2023-2025

Grants, Awards and Honors

Swiss Polar Institute, Exploratory Grant, February 2025
Matterhorn Research Grant, University of Lausanne, November 2024
Matterhorn Research Grant, University of Lausanne, November 2022
Post-Doctoral Knowledge Dissemination Grant, Boston College, September 2019
Geochronology For Student Research Award, Earthscope, June 2015
EAPS Student Research Fund Grant, MIT, October 2015
Graduate Student Research Grant, Geological Society of America, March 2015
EAPS Student Research Fund Grant, MIT, February 2015
Grayce B. Kerr Fellowship, MIT, August 2013
Presidential Graduate Fellowship, MIT, August 2012
Summa cum laude, Amherst College, May 2010
Phi Beta Kappa, Amherst College, May 2010
The Belt-Brophy Prize, Amherst College, May 2009
The Harvey Blodgett & Phi Delta Theta Scholarships, Amherst College, May 2009
Howard Hughes Medical Institute Fellowship, Amherst College, Summer 2007

Publications

Klein, B.Z., Behn, M.D., The impact of mélange formation on the H₂O budget and strength of the subduction zone interface. *Accepted, Geophysical Research Letters*

Gillespie, J., **Klein, B.Z.**, Moore, J., Müntener, O., & Baumgartner, L.P., 2024, A dendritic growth mechanism for producing oscillatory zonation in igneous zircon. *Geology*

Rezeau, H., Jagoutz, O., Beaudry, P., **Klein, B.Z.**, Izon, G., Ono, S. 2024, Lower crustal assimilation revealed by sulfur isotope systematics of the Bear Valley Intrusive Suite, southern Sierra Nevada Batholith, California, USA. *Contributions to Mineralogy and Petrology*, 176(9)

Klein, B.Z., Jagoutz, O., Schmidt, M.W. & Kueter, N. 2023, A global assessment of the controls on the fractionation of arc magmas. *Geochemistry, Geophysics, Geosystems*, 24(5)

Klein, B.Z. & Müntener, O. 2023, Mn/Mg ratios of arc basalts highlight the role of early garnet fractionation. *Geochemical Perspectives Letters*, 25

Klein, B.Z., & Eddy, M.P. 2023, What's in an Age? Calculation and interpretation of ages and durations from U-Pb zircon geochronology of igneous rocks. *Geological Society of America Bulletin*, 136(1-2)

Codillo, E.A., Le Roux, V., **Klein, B.Z.**, Behn, M.D., Marschall, H.R., Bebout, G.E. 2023, The ascent of subduction zone mélanges: experimental constraints on mélange rock densities and solidus temperatures. *Earth and Planetary Science Letters*, 621(1)

Klein, B.Z. & Behn, M.D. 2021, On the evolution and fate of sediment diapirs in subduction zones. *Geochemistry, Geophysics, Geosystems*, 22(11)

Klein, B.Z., & Jagoutz, O. 2021, Construction of a trans-crustal magma system: Building the Bear Valley Intrusive Suite, Southern Sierra Nevada, California. *Earth and Planetary Science Letters*, 553

Rezeau, H., **Klein, B.Z.** & Jagoutz, O. 2021, Mixing dry and wet magmas in the lower crust of a continental arc: New petrological insights from the Bear Valley Intrusive Suite, southern Sierra Nevada, California. *Contributions to Mineralogy and Petrology*, 176(73)

Klein, B.Z., Jagoutz, O. & Ramezani, J. 2020, High precision geochronology requires that ultra-fast mantle-derived magmatic fluxes built the trans-crustal Bear Valley Intrusive Suite, Sierra Nevada, CA, *Geology*, 49(1), 106-110

Jagoutz, O. & **Klein, B.Z.** 2018, On the importance of crystallization-differentiation for the generation of SiO₂-rich melts and the compositional build-up of arc (and continental) crust. *American Journal of Science*, 318(1), 29-63

Klein, B.Z., Jagoutz, O. & Behn, M.D. 2017, Archean crustal compositions promote full mantle convection. *Earth and Planetary Science Letters* 474, 516-526

Olive, J.A., Behn, M.D., Mittelstaedt, E., Ito, G. & **Klein, B.Z.** 2016, The role of elasticity in simulating long-term tectonic extension. *Geophysical Journal International* 205(2), 728-743

In preparation:

Klein, B.Z., Grocolas, T., & Müntener, O., Iron phosphate liquid immiscibility in a calc-alkaline tonalite, Adamello Batholith, Italy., *In preparation for submission to Geology*

Klein, B.Z., Jagoutz, O., VanTongeren, J.A. & Setera, J. Evidence for relamination of subducted sediment in the lower crust of the Sierra Nevada, California. *In preparation for submission to Geosphere*

Selected First Author Conference Presentations

Klein, B.Z., Grocolas, T., Müntener, O., Iron Oxide-Phosphate Liquid Immiscibility in the Western Adamello Tonalite, Italy; 2024 AGU Fall Meeting

Klein, B.Z., Olive, J.-A.O., Müntener, O. and Behn, M.D., Diapirism vs. channel flow: A numerical investigation into the controls on exhumation processes; 2023 AGU Fall Meeting

Klein, B.Z. Jagoutz, O., Schmidt, M.W., and Kueter, N., Liquid lines of descent constrain the storage and differentiation conditions of arc magmas; 2023 AGU Fall Meeting

Klein, B.Z. and Behn, M.D., Role of Mélange Formation on the Devolatilization, Melting, Rheology and Dynamics of the Slab Interface; 2022 AGU Fall Meeting

Klein, B.Z. and Eddy, M.P. What's in an Age? Calculation of ages and durations from U-Pb zircon geochronology of igneous rocks. 2022 AGU Fall Meeting

Klein, B.Z. and Müntener, O., Mn/Mg Ratios of arc basalts highlight the role of early garnet fractionation; 2022 GSA Annual Meeting

Klein, B.Z. and Eddy, M.P. What's in an Age? Calculation of Ages and Durations from U-Pb zircon Geochronology of Igneous Rocks; 2022 GSA Annual Meeting

Klein, B.Z., and Müntener, O., Mn/Mg ratios of arc lavas show that early garnet fractionation occurs near the Moho of thick continental Arcs; 2022 EGU Annual Meeting

Klein, B.Z., and Behn, M.D., On the evolution and fate of sediment diapirs in subduction zones; 2021 AGU Fall Meeting

Klein, B.Z., and Behn, M.D., Modeling the evolution of sediment diapirs in subduction zones; 2020 AGU Fall Meeting

Klein, B.Z., and Jagoutz, O., Construction of the Bear Valley Intrusive Suite, a Trans-Crustal Magma System in the Sierra Nevada, California; *invited abstract*, 2020 GSA Annual Meeting

Klein, B.Z., and Behn, M.D. The Multiple Fates of Subducted Sediments; Goldschmidt 2020

Klein, B.Z., Jagoutz, O., Schmidt, M. and Kueter, N. Wet and Deep vs. Dry and Shallow: Global Fractionation Conditions in Volcanic Arcs; 2019 AGU Fall Meeting

Klein, B.Z., Jagoutz, O. & Ramezani, J. Flare-up without a cause: The Bear Valley Intrusive Suite, Sierra Nevada, CA; 2019 GSA Annual Meeting

Klein, B.Z., Jagoutz, O. & Ramezani, J. How fast can an arc build new crust?; 2018 AGU Fall Meeting

Klein, B.Z. and Jagoutz, O. What controls the stratification and thickness of arc crust?; Goldschmidt 2018

Klein, B.Z., and Jagoutz, O. How is arc crust built? Insights from field observations and modeling; 2017 AGU Fall Meeting

Klein, B.Z., Jagoutz, O. & VanTongeren, J.A. Are arc lower crustal metasediments derived from above or below? A detrital zircon study in the lower crust of the Sierra Nevada, California; 2016 AGU Fall Meeting

Klein, B.Z., Jagoutz, O., Olive, J.A., & Behn, M.D. Compositional controls on subducted slab dynamics in the early Earth; 2015 AGU Fall Meeting

Invited Lectures

Yale University – Department Seminar (February 2025)

Stony Brook University – Department Seminar (October 2024)

University of Southern California – Department Seminar (March 2024)

Stanford University – Department Seminar (February 2024)

University of Lausanne – CUSO Short Course on the lower continental crust (November 2023)

10th Hutton Symposium – Junior Keynote Speaker (September 2023)

Geochronology Gordon Research Conference – Invited Speaker (August 2023)

eFire 2023 Goldschmidt Pre-Conference Workshop – Keynote Speaker (July 2023)

Purdue University – Department Seminar (February 2023)

University of Washington – Department Colloquia (April 2022)

Stanford University – Tectonics-Petrology-Geochronology Seminar (February 2022)

University of Lausanne – Petrology Seminar (October 2021, October 2023)

University of Washington – Department Colloquia (February 2021)

Boston College – Department Seminar (October 2020)

Lamont Doherty Earth Observatory – Geophysics Seminar (February 2017)

Brown University – Geophysics Seminar (April 2016)

Woods Hole Oceanographic Institute – Geophysics/Geochemistry Seminar (April 2016)

Professional Activities

Reviewer:

American Mineralogist, Communications Earth and Environment, Contributions to Mineralogy and Petrology, Earth and Planetary Science Letters, Earth Science Reviews, Geochemistry/Geophysics/Geosystems, Geology, GSA Bulletin, Journal of Geophysical Research, Journal of Petrology, Nature Communications, Nature Geosciences, Science Advances, Geochimica and Cosmochimica Acta, Chemical Geology, NSF Petrology and Geochemistry Program

Member:

American Geophysical Union
Geological Society of America
GEODES (Geoscience Diversity & Equality Switzerland)
PetroNET Planning Committee

Session Convener:

American Geophysical Union Fall Meeting and Swiss Geosciences Meeting

Field Experience

Adamello and Bergell Intrusions, Switzerland and northern Italy (2021, 2022, 2023, 2024)
Seiland Igneous Province, Arctic Norway (2023)
Southernmost Sierra Nevada, California (2015, 2016, 2017)
Mojave Desert, California (2013, 2015, 2017)
Eastern Sierra Nevada, California (2014)
Indian Himalayas (2013)
Highland and Little Belt Mountains, Montana (2009)
New Zealand (2009)
Death Valley and Inyo Mountains, California (2007)