

Barbara C. Ratschbacher | Curriculum Vitae

Updated: September 19th, 2021

University of California, Davis
Department of Earth and Planetary Sciences
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ACADEMIC APPOINTMENTS

University of California, Davis, USA | Assistant Professor (Jan 2021 – present)

California Institute of Technology, USA | Postdoctoral Scholar (Oct 2017 – Oct 2020)

EDUCATION

University of Southern California, USA | PH.D in Geological Sciences (2017)

Advisor: Prof. Scott R. Paterson

Eberhard-Karls Universität Tübingen, Germany | Diplom in Mineralogy (2012)

Advisors: Prof. Dr. Gregor Markl and Dr. Michael Marks

FELLOWSHIPS and ACADEMIC AWARDS

- | | |
|------------------------------|--|
| 2019 Research Funding | <i>Fe³⁺/Fe^T Ratios in Amphiboles - A New Tool for Understanding the Redox State of Arc Magmas</i> (PI Bucholz and PI Jackson; significant contribution to project development and writing). Award No. EAR 1841790. Petrology and Geochemistry Program, National Science Foundation |
| 2019, 2020 Research Funding | Beamtime allocated to conduct experiments at Argonne National Laboratory, USA |
| 2017 Postdoctoral Fellowship | California Institute of Technology |
| 2017 Research Funding | CIDER (Cooperative Institute for Dynamic Earth Research) grant. National Science Foundation |
| 2016 Research Funding | USC WiSE (Women in Science and Engineering) Merit Award |

2015 Graduate Fellowship	USC Research Enhancement Fellowship
2015 Research Funding	NSF-funded EarthScope Award for Geochronology Student Research
2013 Research Funding	Graduate Student Research Grant & Outstanding Mention, Geological Society of America

SERVICE & OUTREACH

- **Invited reviewer**
 - Scientific Journals: American Mineralogist, Nature Geosciences, Lithos
 - National Science Foundation: Petrology and Geochemistry
- **Conference convening**
 - Igneous Processes throughout the Arc Crustal Column and Oceanic Mantle, Goldschmidt Conference, 2018, Boston, USA
 - Dance of Arcs: Causes of Arc Migrations, Flare-ups, and Magmatic Focusing, GSA Annual Meeting 2017, Seattle, USA
 - Causes and Consequences of magmatic and tectonic tempos in Continental and Oceanic Arcs, GSA Cordillera Section Meeting, 2016, Ontario, USA
- **UC Davis services**
 - Graduate Student advisor (Starting Fall 2020)
 - Dissertation Committee member: Elizabeth Grant, Katherine Hewitt, Tyler Schlieder; Prospectus Committee member: Fiona Pedrick

TEACHING

- Igneous Petrology (GEL 105) | UC Davis | Spring 2020
- Field Geology (GEOL 464) | USC | Teaching Assistant 2015, 2017
- Mineralogy (GEOL 315) | USC | Teaching Assistant 2014
- Mineral and Rock Identification | University Tübingen | 2007 - 2011

ADVISING

UC Davis Graduate Students:

Emily Sonnenberg (Aug 2021 – present), Anjelica Guerrier (Sep 2021 – present)

California Institute of Technology Undergraduate Students:

Julia Chen (2019-2020)

University of Southern California Undergraduate Students:

Leslie Insixingmay (2016-2017), Geoffrey Degrande (2015-2016)

FIELD EXPERIENCE

2015, 2016, 2017 Famatinian Arc, Argentina – Structural Geology
2013, 2015, 2016 North Cascades, Washington, USA – Igneous Petrology
2014 Khantaishir Arc, Mongolia – Igneous Petrology
2013 Talkeetna Arc, Alaska – Igneous Petrology
2013 Sierra Nevada Arc, USA – Igneous Petrology
2011 Ilímaussaq intrusion, Greenland – Igneous Petrology

LABORATORY EXPERIENCE

- Calorimetric micro-determination of ferrous iron in silicate minerals and glasses (Leibniz Universität Hannover, Germany)
- High-temperature/pressure experiments using a Piston-cylinder setup (California Institute of Technology, USA)
- Synchrotron-based Mössbauer spectroscopy of amphibole single grains (Advanced Photon Source, Argonne National Laboratory, USA)
- Secondary-ion mass spectrometry (SIMS) of H isotope and water contents in amphiboles (California Institute of Technology, USA)
- Single mineral XRD (California Institute of Technology, USA)
- Sample preparation and analyses for U-Pb ID-TIMS-TEA geochronology and trace element measurements in zircon (Princeton University, USA)
- In-situ trace element LA-ICP-MS analyses of zircon (UCSB, USA)
- In-situ trace element LA-ICP-MS analyses of amphibole, pyroxene and titanite (Texas Tech University, USA)
- Electron microprobe analyses of major elements in silicate minerals (UCLA, USA and Eberhard-Karls Universität Tübingen, Germany)
- Sample preparation and XRF analyses (Eberhard-Karls Universität Tübingen, Germany and Pomona College, USA)

PUBLICATIONS

- submitted* **Ratschbacher, B.C.**, Paterson S. R., Anderson J. L.: Changes in architecture, geochemistry, and construction timescales of intrusive complexes in the upper ~35 km of a transcrustal magmatic system: The Cretaceous Cascades arc, Washington, USA, *Lithos*, submitted 08/08/2021
- in revision* **Ratschbacher, B. C.**, Jackson, J.M., Toellner T.S., Bucholz, C.E., Sturhahn, W., Solomatova N.V.: Fe³⁺/Fe^T ratios of amphiboles determined by high-spatial resolution single-crystal synchrotron Mössbauer spectroscopy, *American Mineralogist*, submitted 15/04/2021
- in press* **Ratschbacher, B.C.**, Cawood, T., Larrovere, M.A., Alasino, P.H., Memeti V.: The ≥ 6-km Cuesta de Randolph mylonite zone in Ordovician Famatinian peraluminous granites, NW Argentina: strain-localization as a function of protolith composition. *Journal of South American Earth Sciences*
- 2021 Delph, J. R., Shimizu, K., **Ratschbacher, B. C.**: The architecture of the southern Puna magmatic system: integrating seismic and petrologic observations with geochemical modeling. *Journal of Geophysical Research: Solid Earth*, v. 126, <https://doi.org/10.1029/2020JB021550>
- 2021 Lusk, A. D., **Ratschbacher, B.C.**, Larrovere, M. A., Alasino, P. H., Memeti, V., & Paterson, S. R.: Upper-crustal architecture and record of Famatinian arc activity in the Sierra de Narv ez and Sierra de Las Planchadas, NW Argentina. *Journal of South American Earth Sciences*, v. 105, <https://doi.org/10.1016/j.jsames.2020.102895>.
- 2020 Werts, K., Barnes, C. G., Memeti, V., **Ratschbacher, B.C.**, Williams, D., Paterson, S. R.: Hornblende as a tool for assessing mineral-melt equilibrium and recognition of crystal accumulation." *American Mineralogist*, v. 105.1, p. 77-91. <https://doi.org/10.2138/am-2020-6972>
- 2019 **Ratschbacher B.C.**, Paterson, S., Fischer, T.: Spatial and depth-dependent variations in magma volume addition and addition rates to continental arcs: Application to global CO₂ fluxes since 750 Ma. *Geochemistry, Geophysics, Geosystems*, v. 20, p. 2997-3018. <https://doi.org/10.1029/2018GC008031>.
- 2018 **Ratschbacher, B.**, Keller, C. B., Schoene, B., Paterson, S. R., Anderson, J. L., Okaya, D., Putirka, K., Lippoldt, R.: A new workflow to assess emplacement duration and melt residence time of compositionally diverse magmas emplaced in a sub-volcanic reservoir. *Journal of Petrology*, v. 59, no. 9, p. 1787-1809. <https://doi.org/10.1093/petrology/egy079>.

- 2017 Larrovere, M.A., Suzaño, N., **Ratschbacher, B.C.**, Sola, A., Alasino, P.H., Fuentes, M.G., Weinberg, R.F., Paterson, S.R., Becchio, R., Finch, M.A.: Las fajas de cizalla dúctil del basamento ígneo-metamórfico del NOA. *In: Muruaga, C.M. y Grosse, P. (Eds.), Ciencias de la Tierra y Recursos Naturales del NOA. Relatorio del XX Congreso Geológico Argentino, San Miguel de Tucumán: 579-601. ISBN 9789874266668.*
- 2015 **Ratschbacher, B.C.**, Marks, M., Bons, P. and Markl, G.: Emplacement and geochemical evolution of highly evolved syenites investigated by a combined structural and geochemical field study: The Iujavrites of the Ilímaussaq complex, SW Greenland. *Lithos*, v. 231, p. 62-76. <https://doi.org/10.1016/j.lithos.2015.06.004>

CONFERENCE CONTRIBUTIONS

Delph, J. R., Shimizu, K., **Ratschbacher, B. C.** (2021): Integrating seismic, geochemical, and petrological observations to understand the Trans-Lithospheric Structure of magmatic systems: The southern Puna Plateau. *Oral presentation GSA Annual meeting, Portland.*

Ratschbacher B., Paterson, S.R., Fischer T.P. (2020): Depth-dependent and temporal evolution of magma addition rates and geochemical compositions in the plutonic record of continental arc crustal sections. Invited oral presentation. AGU FALL Meeting, Virtual.

Ratschbacher B., Bucholz C.E., Jackson J.M., Solomatova N.V. (2018): Variations in Fe^{3+}/Fe^T in amphibole as a function of magmatic oxygen fugacity and mineral composition. *Poster presentation at AGU Fall Meeting 2018, Washington D.C.*

Ratschbacher B., Paterson S., Fischer T.P. (2018): Magma addition rates in continental arcs: A new protocol of calculation and global implications. *Talk at the Goldschmidt conference 2018, Boston, USA.*

Delph J., Shimizu K., Rasmussen D.J., **Ratschbacher B.**, Pu X. (2018): A geochemical and seismic search for deep, active MASH zones. *Invited oral presentation at the Goldschmidt conference 2018, Boston, USA.*

Werts K., Barnes C.G., Memeti V., Paterson S., **Ratschbacher B.**, Williams D. (2018): Volcanic vs Plutonic Hornblende: Tools for Discerning Crystal Accumulation and Melt Loss. *Oral presentation at the Goldschmidt conference 2018, Boston, USA.*

Ratschbacher B., Cawood T., Lusk A., Larrovere M., Rock C., Alasino P., Paterson S., Memeti V. (2018): Strain localization mechanisms (or lack thereof) in a ~10 km wide, syn- to post-magmatic mylonite zone in the Famatinian arc. *Poster presentation at the EGU meeting, Vienna, Austria.*

Pu X., Delph J.R., Shimizu K., Rasmussen D.J., **Ratschbacher B.** (2017): Where do arc magmas differentiate? A seismic and geochemical search for active, deep crustal MASH zones. *Poster presentation at the AGU meeting, 2017, New Orleans.*

Ratschbacher B., Paterson S., Alasino P., Larrovere M., Cao W., Okaya D. (2017): Depth-dependent changes in deformation and magmatism in the Famatinian arc. Argentina: Implications for isostatic responses and mountain building. *Invited talk at GSA Annual Meeting, Seattle, USA.*

Attia, S., Paterson S., Ardill K., Martinez A., **Ratschbacher B.**, Cao W., Cottle J. (2017): Upper crustal Evolution during an arc flare-up: Integrating sedimentary, volcanic, and plutonic records of the Triassic-early Jurassic continental arc upper crustal section, eastern-central Sierra Nevada, CA. *Poster presentation at the GSA Annual Meeting, Seattle, USA.*

Cawood T., Paterson S., **Ratschbacher B.**, Lusk A., Larrovere M., Alasino P., Rick C., Memeti V. (2017): Strain (de-)localization in the ~ 10 km wide Cuesta de Randolph mylonite zone, Famatinian arc. *Poster presentation at the GSA Annual Meeting, Seattle, USA.*

Larrovere M., Paterson S., Alasino P., **Ratschbacher B.**, Lusk A., Cawood T. (2017): Architecture of a crustal scale ductile shear zone system in a hot orogen: the Ordovician Famatinian orogen, NW Argentina. *Oral presentation at the GSA Annual Meeting, Seattle, USA.*

Hartman S., Paterson S., **Ratschbacher B.** (2017): A revised loading and exhumation model for the Swakane biotite gneiss, Cascades Crystalline Core (CCC), WA: Implications for Mesozoic Tectonics. *Poster presentation at the GSA Annual Meeting, Seattle, USA.*

Lusk A., Paterson S., **Ratschbacher B.**, Larrovere M., Alasino P., Memeti V., Cawood T., Hernandez R. (2017): Deformation of the uppermost Famatinian orogen: Mapping and structural analysis from the Sierra de Narv ez and Sierra de Las Planchadas, NW Argentina. *Poster presentation at the GSA Annual Meeting, Seattle, USA.*

Alasino P., Memeti V., **Ratschbacher B.**, Larrovere M., Paterson S., Lusk A., Cawood T. (2017): Geochemical architecture and evolution of the Famatinian magmatic arc

crustal section in NW Argentina. *Poster presentation at the GSA Annual Meeting, Seattle, USA.*

Memeti V., Paterson S., Alasino P., **Ratschbacher B.**, Larrovere M., Ardill K., Cawood T., Lusk A., Insixiengmay L. (2017): Igneous architecture at the top of the Famatinian arc, NW Argentina. *Poster presentation at the GSA Annual Meeting, Seattle, USA.*

Ratschbacher B., Keller B., Schoene B., Paterson S., Anderson L., Okaya D., Putirka K., Lippoldt R. (2017): Time scales of construction and compositional evolution of a bimodal shallow crustal magma reservoir and implications for differentiation in the upper crust. *Poster presentation at the IAVCEI Scientific Assembly 2017, Portland, USA.*

Ratschbacher B., Paterson S., Anderson L. (2016): Investigating magmatic and tectonic processes from 5 to 30 km depth in a thick continental magmatic arc, ~ 90 Ma magmatism in the Cascades, Washington, USA. *Poster presentation at the EMC conference 2016 in Rimini, Italy.*

Ratschbacher B., Degrande G., Larrovere M., Paterson S. and Alasino P. (2016): A > 4 km wide ductile shear zone in the Cuesta de Randolph: Late-stage strain localization in the Famatinian orogeny, Argentina. *Poster presentation at GSA Cordillera Section Meeting, Ontario, USA.*